CE TIPS

HOME THEATER

AUGUST 2004

CE Tips
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Consumer Electronics

Your User Guide To Consumer Electronics & Computers

A Sandhills Publication

CONSUMER ELECTRONICS TIPS

22 Pages Of

Home Theater

Setup, Use & Troubleshooting Tips

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Make Your Video Better: 10 Editing Tips Inside

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Build Your Own Wireless Network

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Do-It-Yourself Speaker Wire

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August 2004
Vol. 2 Iss. 8
$5.99 U.S.
$7.99 Canada

IBM ThinkPad X Series

GO with IBM Think Express Program

IBM ThinkExpress models are designed, configured and priced with small to medium-size businesses in mind.

CNET Editors Choice Award, March, 2004
IBM ThinkPad X40

*__Availability:__ All offers subject to availability. IBM reserves the right to alter product offerings and specifications at any time, without notice. IBM is not responsible for photographic or typographic errors. **Pricing:** does not include tax or shipping and is subject to change without notice. Reseller prices may vary. **Warranty:** For a copy of applicable product warranties, write to: Warranty Information, P.O. Box 12195, RTP, NC 27709, Attn: Dept JDJA/B203. IBM makes no representation or warranty regarding third-party products or services. **Footnotes: (1) Mobile Processor:** Power management reduces processor speed when in battery mode. **(2) Wireless 11a, 11b and 11g:** based on IEEE 802.11a, 802.11b and 802.11g, respectively. An adapter with 11a/b, 11b/g or 11a/b/g can communicate on either or any of these listed formats respectively; the actual connection will be based on the access point to which it connects. **(3) Included software:** may differ from its retail version (if available) and may not include user manuals or all program functionality. License agreements may apply. **(4) Hard drive:** GB = billion bytes. Accessible capacity is less; up to 4GB is service partition. **(5) Memory:** For PCs without a separate video card, memory supports both system and video. Accessible system memory is up to 64MB less than the amount stated, depending on video mode. **(6) Limited warranty:** Support unrelated to a warranty issue may be subject to additional charges. **(7) ServicePac services:** are available for machines normally used for business, professional or trade purposes, rather than personal, family or household purposes. Service period begins with the equipment date of purchase. Service

IBM recommends Microsoft® Windows® XP Professional for Business.

MOBILE TECHNOLOGY

Protect your data against accidents when you're on the road.

Accidents definitely do happen. Especially when you're working wirelessly. Which is why you should have an IBM ThinkPad® notebook with Intel® Centrino™ Mobile Technology. Select ThinkPad notebooks are the only PCs designed to sense a fall and, within 500 milliseconds, park the hard drive's read/write head. Kind of like an airbag for your data. To view a demo, visit **ibm.com**/shop/m443. You'll see why select IBM ThinkPad notebooks with Intel Centrino Mobile Technology give wireless users the confidence to tackle almost anything — networking, presentations, even the occasional meeting with the pavement. And go from "oh, #@*^!" to "phew" in less than a second.

Klutz-proof wireless. Only on a ThinkPad.

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NEW! IBM ThinkPad R51

Ultimate Value

Distinctive IBM Innovations:

- IBM Active Protection System – Helps protect your hard-drive from falls

System Features:

- Intel® Centrino™ Mobile Technology
  - Intel Pentium® M Processor 1.50GHz[1]
  - Intel PRO/Wireless Network Connection 802.11b/g[2]
- Microsoft Windows XP Professional[3]
- 14.1" XGA TFT display (1024x768)
- 256MB DDR SDRAM[5]
- 20GB hard drive[4]
- Ultrabay™ Enhanced CD-RW/DVD-ROM combo
- IBM UltraConnect™ Antenna for increased signal strength[12]
- 1-yr system/battery limited warranty[6]

NavCode 28832XU-M419
THINK EXPRESS MODEL PRICED AT: **$1,299***

ServicePac® Service Upgrade:[7]
3-yr Depot Repair #30L9192 **$132**

IBM ThinkPad X40

Our thinnest and lightest

Distinctive IBM Innovations:

- IBM Active Protection System – Helps protect your hard-drive from falls
- NEW! IBM Rescue and Recovery™ with Rapid Restore™ – One-button recovery and restore solution

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor ULV 1GHz
  - Intel PRO/Wireless Network Connection 802.11b
- Microsoft Windows XP Professional
- 12.1" XGA TFT display (1024x768)
- 256MB DDR SDRAM
- 20GB hard drive
- Integrated Gigabit Ethernet and modem
- Legendary IBM full-size keyboard[8]
- Only .94" thin[11]
- 2.7-lb travel weight[10]
- 1-yr system/battery limited warranty[6]

NavCode 23861CU-M419
THINK EXPRESS MODEL PRICED AT: **$1,499**

levels are response-time objectives and are not guarantees. Calls must be received by 5pm local time in order to qualify for Next Business Day service. If the machine problem turns out to be a Customer Replaceable Unit (CRU), IBM will express ship the part to you for quick replacement. Onsite 24x7x2-hour service is not available in all locations. For ThinkPad notebooks requiring LCD or other component replacement, IBM may choose to perform service at the depot repair center. **(8) Full-size keyboard:** As defined by ISO/IEC 15412. **(10) Travel weight:** includes battery and optional travel bezel instead of standard optical drive in Ultrabay bay, if applicable; weight may vary due to vendor components, manufacturing process and options. **(11) Thinness:** may vary at certain points on the system. **(12) Wireless capability:** requires compatible wireless-enabled options, sold separately. **Trademarks:** The following are trademarks or registered trademarks of IBM Corporation: IBM, the IBM logo, Rapid Restore, Rescue and Recovery, ThinkPad, Ultrabay, UltraConnect and UltraNav. Microsoft and Windows are registered trademarks of Microsoft Corporation. Intel, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Intel SpeedStep and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. Other company, product and service names may be trademarks or service marks of other companies. © 2004 IBM Corporation. All rights reserved. **Visit *www.ibm.com/pc/safecomputing* periodically for the latest information on safe and effective computing.**

Take a look at our latest models. And get something nice to shout about.

Why IBM ThinkPad Notebooks?

To make IBM ThinkPad® notebooks even more valuable, each one featured here comes with all the following ThinkVantage™ Technologies:

IBM Active Protection System:

Butterfingers unite! IBM ThinkPad notebooks now include airbag like technology to help protect your hard drive from some damage caused by drops and jolts (select models).

NEW! Rescue and Recovery with Rapid Restore:

Lost your data because of a software crash or virus? Recover previously saved data in minutes with our one-button solution.

Access Connections:

Switch between wired and wireless connections.

Embedded Security Subsystem 2.0:[1]

Hackers and thieves, beware. Our combined hardware and software solution is designed to protect user data and keep it private.

Access IBM:

Get the help you need, when you need it. One button on your ThinkPad notebook brings you a world of resources and assistance.

NEW! IBM ThinkPad R51

System Features:

- Intel® Centrino™ Mobile Technology
  - Intel Pentium® M Processor 1.50GHz[2]
  - Intel PRO/Wireless Network Connection 802.11b/g[3]
- Microsoft Windows XP Professional[4]
- 15" SXGA+ TFT display (1400x1050)
- 256MB DDR SDRAM[5]
- 40GB hard drive[6]
- Integrated Ethernet and modem
- IBM Ultrabay™ Enhanced CD-RW/DVD-ROM combo
- IBM UltraConnect™ Antenna for increased signal strength[16]
- 1-yr system/battery limited warranty[7]

NavCode 1836BDU-M419

THINK EXPRESS MODEL PRICED AT: **$1,499***

With Microsoft Office Small Business Edition 2003:[8] $1,739

NEW! IBM ThinkPad T42

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor 1.50GHz
  - Intel PRO/Wireless Network Connection 802.11b/g
- Microsoft Windows XP Professional
- 14.1" XGA TFT display (1024x768)
- 32MB ATI Mobility RADEON 7500
- 256MB DDR SDRAM
- 30GB hard drive
- Integrated Gigabit Ethernet and modem
- IBM Ultrabay Slim DVD-ROM
- IBM UltraConnect Antenna for increased signal strength
- Only 1" thin,[10] 4.5-lb travel weight[9]
- 1-yr system/battery limited warranty[7]

NavCode 2378DTU-M419

THINK EXPRESS MODEL PRICED AT: **$1,629**

With Microsoft Office Small Business Edition 2003: $1,869

ServicePac Service Upgrade:
3-yr Depot Repair #30L9192 **$132**

NEW! IBM ThinkPad T42

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor 735 (1.70GHz, 400MHz FSB)
  - Intel PRO/Wireless Network Connection 802.11b/g
- Microsoft Windows XP Professional
- 15" SXGA+ TFT display (1400x1050)
- 512MB DDR SDRAM
- 64MB ATI Mobility RADEON 9600 graphics
- 60GB hard drive (7200 RPM)
- Integrated Gigabit Ethernet and modem
- IBM Ultrabay Slim CD-RW/DVD-ROM combo
- IBM UltraConnect Antenna for increased signal strength
- 3-yr system/1-yr battery limited warranty[7]

NavCode 2379DXU-M419

THINK EXPRESS MODEL PRICED AT: **$2,529**

With Microsoft Office Small Business Edition 2003: $2,769

ServicePac Service Upgrade:
4-yr Onsite Repair/9x5/Next Business Day Response #69P9198 **$299**

IBM ThinkPad X40

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor ULV 1GHz
  - Intel PRO/Wireless Network Connection 802.11b
- Microsoft Windows XP Professional
- 12.1" XGA TFT display (1024x768)
- Intel Extreme Graphics 2
- 256MB DDR SDRAM
- 20GB hard drive
- Integrated Gigabit Ethernet and modem
- Legendary IBM full-size keyboard[12]
- Only .94" thin
- 2.7-lb travel weight
- 1-yr system/battery limited warranty[7]

NavCode 23861CU-M419

THINK EXPRESS MODEL PRICED AT: **$1,499**

With Microsoft Office Small Business Edition 2003: $1,739

ServicePac® Service Upgrade:[11]
2-yr Onsite Repair/9x5/Next Business Day Response #30L9189 **$197**

IBM ThinkPad X40

Distinctive IBM Innovations:

- Longest standard battery life of any leading-brand notebook[13]

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor LV 1.20GHz
  - Intel PRO/Wireless Network Connection 802.11b
- Microsoft Windows XP Professional
- 12.1" XGA TFT display (1024x768)
- Intel Extreme Graphics 2
- 256MB DDR SDRAM
- 40GB hard drive
- Integrated Gigabit Ethernet and modem
- Legendary IBM full-size keyboard
- 7.5-hr Li-Ion battery[17]
- 1-yr system/battery limited warranty[7]

NavCode 23866GU-M419

THINK EXPRESS MODEL PRICED AT: **$1,749**

ServicePac Service Upgrade:
3-yr Onsite Repair/9x5/Next Business Day Response #30L9195 **$243**

IBM ThinkPad X40 Solution Pack

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor ULV 1GHz
  - Intel PRO/Wireless Network Connection 802.11b
- Microsoft Windows XP Professional
- 12.1" XGA TFT display (1024x768)
- 256MB DDR SDRAM
- 20GB hard drive
- Only .94" thin
- 2.7-lb travel weight
- 1-yr system/battery limited warranty[7]

Accessories Included:

- ThinkPad X4 UltraBase™ Dock
- IBM Ultrabay Slim CD-RW/DVD-ROM combo

NavCode 23861ZU-M419

THINK EXPRESS MODEL PRICED AT: **$1,799**

ServicePac Service Upgrade:
3-yr Onsite Repair/9x5/Next Business Day Response #30L9195 **$243**

IBM ThinkPad X40 Solution Pack

Distinctive IBM Innovations:

- Longest standard battery life of any leading-brand notebook

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor LV 1.20GHz
  - Intel PRO/Wireless Network Connection 802.11b
- Microsoft Windows XP Professional
- 12.1" XGA TFT display (1024x768)
- 256MB DDR SDRAM
- 40GB hard drive
- Integrated Gigabit Ethernet and modem
- 7.5-hr Li-Ion battery
- 3-yr system/1-yr battery limited warranty[7]

Accessories Included:

- ThinkPad X4 UltraBase Dock
- IBM Ultrabay Slim CD-RW/DVD-ROM combo

NavCode 23826UU-M419

THINK EXPRESS MODEL PRICED AT: **$2,199**

ServicePac Service Upgrade:
5-yr Onsite Repair/9x5/Next Business Day Response #69P9200 **$449**

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***Availability:** All offers subject to availability. IBM reserves the right to alter product offerings and specifications at any time, without notice. IBM is not responsible for photographic or typographic errors. **Pricing:** does not include tax or shipping and is subject to change without notice. Reseller prices may vary. **Warranty:** For a copy of applicable product warranties, write to: Warranty Information, P.O. Box 12195, RTP, NC 27709, Attn: Dept JDJA/B203. IBM makes no representation or warranty regarding third-party products or services. **Footnotes: (1) Embedded security system:** requires software download. **(2) Mobile Processors:** Power management reduces processor speed when in battery mode. **(3) Wireless 11a, 11b and 11g:** based on IEEE 802.11a, 802.11b and 802.11g, respectively. An adapter with 11a/b, 11b/g or 11a/b/g can communicate on either or any of these listed formats respectively; the actual connection will be based on the access point to which it connects. **(4) Included software:** may differ from its retail version (if available) and may not include user manuals or all program functionality. License agreements may apply. **(5) Memory:** For PCs without a separate video card, memory supports both system and video. Accessible system memory is up to 64MB less than the amount stated, depending on video mode. **(6) Hard drive:** GB = billion bytes. Accessible capacity is less; up to 4GB is service partition. **(7) Limited warranty:** Support unrelated to a warranty issue may be subject to additional charges. **(8) Microsoft Office XP:** Certain Microsoft software product(s) included with this computer may use technological measures for copy protection. IN SUCH EVENT, YOU WILL NOT BE ABLE TO USE THE PRODUCT IF YOU DO NOT FULLY COMPLY WITH THE PRODUCT ACTIVATION PROCEDURES. Product activation procedures and Microsoft's privacy policy will be detailed during initial launch of the product, or upon certain reinstallations of the software product(s) or reconfigurations of the computer, and may be completed by Internet or telephone (toll charges may apply). **(9) Travel weight:** includes battery and optional travel bezel instead of standard optical drive in

(Monitor not included)

(Monitor not included)

(Monitor not included)

Why IBM ThinkCentre PCs?

Only IBM offers these features to protect you, connect you, and keep you working. Each ThinkCentre™ desktop featured here can give you the efficiency, productivity and edge you need with the following ThinkVantage Technologies:

IBM Rapid Restore Ultra:

Lost your data because of a software crash or virus? Recover previously saved data in minutes with our one-button solution.

Access IBM:

Get the help you need, when you need it. One button on your ThinkCentre desktop brings you a world of resources and assistance.

ImageUltra™ Builder:

Need to roll out new systems? Image and copy your operating system across your network in a flash. (Order separately)

IBM ThinkCentre A50p

System Features:

- Intel® Pentium® 4 Processor 520 with HT Technology
  - Processor speed 2.80GHz
  - 800MHz FSB
- Microsoft Windows XP Professional
- 256MB DDR PC2700[5]
- 40GB hard drive • CD-RW
- Integrated 10/100 Ethernet
- Norton AntiVirus™ with 90 days of virus definition updates
- Lotus® SmartSuite® Millennium license
- 1-yr parts/1-yr limited onsite service limited warranty[14]

NavCode 843398U-M419

THINK EXPRESS MODEL PRICED AT: **$699**

IBM ThinkCentre A50

Distinctive IBM Innovations:

- The smallest IBM desktop without compromise: 62% smaller than a standard IBM desktop

System Features:

- Intel Pentium 4 Processor 520 with HT Technology
  - Processor speed 2.80GHz
  - 800MHz FSB
- Microsoft Windows XP Professional
- 256MB DDR PC2700
- 40GB hard drive • CD-ROM
- Integrated 10/100 Ethernet
- Norton AntiVirus with 90 days of virus definition updates
- Lotus SmartSuite Millennium license
- 3-yr parts/1-yr limited onsite service limited warranty[14]

NavCode 841933U-M419

THINK EXPRESS MODEL PRICED AT: **$749**

ServicePac Service Upgrade:
4-yr Onsite Repair/9x5/Next Business Day Response #69P9158 **$198**

IBM ThinkCentre A50p

System Features:

- Intel Pentium 4 Processor 520 with HT Technology
  - Processor speed 2.80GHz
  - 800MHz FSB
- Microsoft Windows XP Professional
- 256MB DDR PC2700
- 40GB hard drive • CD-RW
- Norton AntiVirus with 90 days of virus definition updates
- Integrated 10/100 Ethernet
- Lotus SmartSuite Millennium license
- 3-yr parts/1-yr limited onsite service limited warranty[14]

NavCode 843298U-M419

THINK EXPRESS MODEL PRICED AT: **$799**

IBM ThinkCentre S50

Distinctive IBM Innovations:

- The smallest IBM desktop without compromise: 62% smaller than a standard IBM desktop

System Features:

- Intel Pentium 4 Processor 520 with HT Technology
  - Processor speed 2.80GHz
  - 800MHz FSB
- Microsoft Windows XP Professional
- 512MB DDR PC2700
- 40GB hard drive • CD-ROM
- Norton AntiVirus with 90 days of virus definition updates
- Gigabit Ethernet-integrated
- 3-yr limited warranty with limited onsite service[14]

NavCode 818336U-M419 **$1,079**

With Microsoft Office Small Business Edition 2003: $1,319

ServicePac Service Upgrade:
4-yr Onsite/9x5/4-hr Response
#69P9162 **$250**

IBM ThinkCentre M50

System Features:

- Intel Pentium 4 Processor 520 with HT Technology
  - Processor speed 2.80GHz
  - 800MHz FSB
- Microsoft Windows XP Professional
- 512MB DDR PC2700
- 40GB hard drive • CD-ROM
- Intel Extreme Graphics 2
- Gigabit Ethernet-integrated
- 3-yr limited warranty with limited onsite service[14]

NavCode 8187EJU-M419 **$1,049**

With Microsoft Office Small Business Edition 2003: $1,288

ServicePac Service Upgrade:
3-yr Onsite/9x5/4-hr Response
#41L2734 **$129**

intel inside centrino™ MOBILE TECHNOLOGY

IBM recommends Microsoft® Windows® XP Professional for Business.

IBM ThinkExpress Program:

We've designed and priced many of our products specifically for small and medium businesses. And best of all, they're available direct from IBM or through select IBM Business Partners.

IBM ThinkPad Accessories

Belkin Components Universal Notebook Travel Surge Protector
#22P7127 **$20**

Targus Deluxe Mobile Essentials Kit
#22P7437 **$60**

ThinkPad Premiere Leather Carrying Case[15]
#10K0209 **$99**

ThinkPad 72W AC/DC Combo Adapter
#22P9010 **$99**

ThinkPad Port Replicator II
#74P6733 **$179**

IBM ThinkCentre Accessories

IBM 128MB USB 2.0 High-Speed Memory Key
#22P9229 **$59**

Lexmark X5270 All-in-One Printer
#22P8808 **$140**

IBM ThinkVision™ L170 17" Flat Panel Monitor with system purchase
#W9SPAB0 **$449**

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Ultrabay bay, if applicable; weight may vary due to vendor components, manufacturing process and options. **(10) Thinness:** may vary at certain points on the system. **(11) ServicePac services:** are available for machines normally used for business, professional or trade purposes, rather than personal, family or household purposes. Service period begins with the equipment date of purchase. Service levels are response-time objectives and are not guarantees. If the machine problem turns out to be a Customer Replaceable Unit (CRU), IBM will express ship the part to you for quick replacement. Onsite 24x7x2-hour service is not available in all locations. For ThinkPad notebooks requiring LCD or other component replacement, IBM may choose to perform service at the depot repair center. Calls must be received by 5pm local time in order to qualify for Next Business Day Service. **(12) Full-size keyboard:** As defined by ISO/IEC 15412. **(13) Battery life:** Based on manufacturer's published figures or CNET.com results for the top 5 vendors in 2003 notebook sales based on IDC data, as of 1/29/2004. **(14) Systems with limited onsite service:** are designed to be repaired during the applicable warranty period primarily with customer-replaceable parts provided by IBM. IBM will only send a technician onsite to perform a repair if (a) remote telephone diagnosis and/or customer part replacement are unable to resolve the problem, or (b) the part is one of the few designated by IBM for onsite replacement. For a list of onsite replaceable parts, contact IBM. Support unrelated to a warranty issue may be subject to additional charges. **(15) Certain IBM logo products:** are not manufactured, warranted or supported by IBM; IBM logos and trademarks used under license. Contact IBM for details. **(16) Wireless capability:** requires compatible wireless-enabled options, sold separately. **(17) Battery:** These model numbers achieved the Ziff Davis Media, Inc.'s Business Winstone® 2002 BatteryMark™ Version 1.0 Battery Rundown Time of at least the time shown. This test was performed without independent verification by the VeriTest testing division of Lionbridge Technologies, Inc. ("VeriTest") or Ziff Davis Media, Inc.; neither Ziff Davis Media, Inc., nor VeriTest makes any representations or warranties as to these test results. Winstone is a registered trademark and BatteryMark is a trademark of Ziff Davis Publishing Holdings, Inc., in the U.S. and other countries. A description of the environment under which the test was performed is available at ibm.com/pc/ww/thinkpad/batterylife. Battery life (and recharge times) will vary based on many factors including screen brightness, applications, features, power management, battery conditioning and other customer preferences. **Trademarks:** The following are trademarks or registered trademarks of IBM Corporation: IBM, the IBM logo, ImageUltra, Lotus, NavCode, Rapid Restore, Rescue and Recovery, SmartSuite, ThinkCentre, ThinkPad, ThinkVantage, ThinkVision, UltraConnect, UltraBase, Ultrabay and UltraNav. Microsoft and Windows are registered trademarks of Microsoft Corporation. Intel, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Intel SpeedStep and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. Other company, product and service names may be trademarks or service marks of other companies. © 2004 IBM Corporation. All rights reserved.

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Consumer Electronics

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Open

This month's Open section serves up the usual helping of CE news, new product info, and commentary (Sascha Segan weighs in on computer viruses and Internet-connected devices), as well as 10 handy tips on editing your digital video.

8 **10 Tips On . . . Editing Digital Video**

10 **CE News**

14 **ShelfWatch**
A Look At The Latest Consumer Electronics

18 **Shuffle**
Security Worries Worth Sneezing At

20 **Extreme CE**
When Money Is No Object

22 **Gadget Envy**
House Proud

A/V Club

If you've ever installed your own speakers, you're probably aware that it's tough to get speaker wire that's just the right length for your needs. That's why we take you step-by-step through the process of cutting, stripping, and adding connectors to your own custom-length wire. Also, we look at digital radio's progress, show you how to add a second amp to your home theater for 7.1 or multiroom audio, and more.

26 **A/V Project**
DIY Custom-Length Speaker Wire

29 **Digital Radio Goes Local**
Understanding HD Radio

32 **Out Of The Box**
Add A Second Amp To Your Home Theater System

35 **A/V Tips**
Make Your A/V Products Work At Their Best

37 **Sights & Sounds**
If You Have To Ask, You Can't Afford It

Home Theater How-Tos

Today's home theaters are affordable, high-powered technical marvels that in many cases make staying home for the evening a more attractive option than fighting the lines at the local cinema (not to mention paying exorbitant fees for mediocre snacks). But a good home theater also presents many users with a whole new set of technical problems and questions; instead of a simple TV-VCR combo, modern home theater setups often include a high-tech TV, a slick A/V receiver, six or more speakers, a DVD player, a set-top box or satellite receiver, a DVR, and more. Whether you're looking for help in setting up your movie oasis, troubleshooting it, or just squeezing an extra ounce or two of performance out of it, the following six articles are for you.

40 **Portrait Of A Home Theater Enthusiast**
A Regular Guy With Some Cool Gear

42 **Home Theater Basics**
Solid Components For The Immersive Quality You Crave

46 **Maximize Your Multiplex**
Tips For Setting Up Your Home Theater

52 **Power Play**
Practical, Effective Home Theater Usage Tips

58 **Pesky A/V Bugs**
Home Theater Troubleshooting Tips Help You Swat 'Em

63 **Glossary**

Digital Studio

DIGITAL PHOTOGRAPHY IS ATTRACTING VAST SWARMS OF CONVERTS away from film photography each year, thanks to the immediacy and convenience it provides. But good photography technique is important whether you're shooting digital or film, and that's why you'll find articles in this month's Digital Studio section offering pointers on using hyperfocal distance and explaining parallax error. You'll also get some pointers on how to print better digital photos, as well as a look at how digital camcorders' low-light and no-light video capture features work.

64 The Near & Far Of It
Hyperfocal Distance Maximizes Your Camera's Reach

69 CE Dejargonater
Parallax Error

70 Picture Perfect
Turn Your Digital Images Into Fantastic Prints

74 See In The Dark
How Camcorders Use Night Vision To Create Their Own Light

CE @Home

AS YOU REPLACE YOUR TRIED-AND-TRUE ELECTRONIC GADGETS and components with new ones, you can either stuff the old gear in a closet somewhere to collect dust or find new homes for it. Check out our guide to selling your stuff at Web auction powerhouse eBay and give your veteran electronics a chance at a new life. Then find out how push-to-talk, or walkie-talkie, phones work and whether they're right for you and bone up on setting up that wireless network you've been mulling over for the last year or so.

76 Offload At eBay
Clear Your Shelves & Make A Few Bucks

80 Pushing The Envelope
Everything You Ever Wanted To Know About Push-To-Talk Phones

84 Internet Anywhere
Build Your Own Wireless Network

Reviews

THIS MONTH, GET OUR TAKE ON LOTS OF CE PRODUCTS, including a Harman Kardon receiver, one of Panasonic's latest 3CCD digital camcorders, a set of Paradigm home theater speakers, a Kenwood car amp, B&W's 650 In-Wall Speaker, and an exotic Loewe TV. Then see how four affordable subwoofers stack up and get the lowdown on two digital media programs and a document management program for your PDA.

88 Hardware Reviews

Harman Kardon AVR 330	88
Panasonic PV-GS120 Camcorder	89
Paradigm Cinema 70 HTIB	89
Kenwood Excelon KAC-X621 Amplifier	90
B&W CWM 650 In-Wall Speaker	92
Loewe Aconda ACO 9303	92

93 CE Face-Off
Subwoofers ($500 To $750)

97 Software Reviews

Magix music maker deLuxe 2005	97
Microsoft Picture It! Photo Premium 9	98
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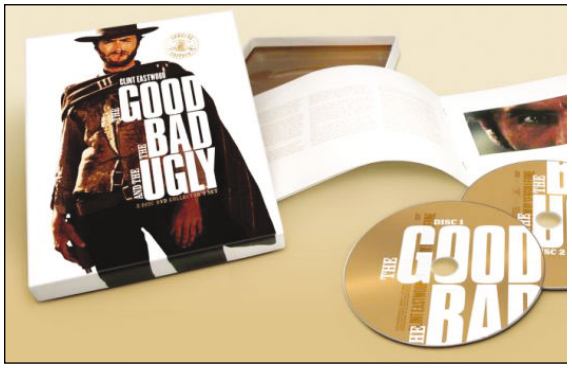
Press Play

PRESS PLAY IS YOUR TICKET to consumer electronics fun, from a two-page sampling of fun, interesting gadgets to recent music, movie, and game releases to a look at the evolution of the PDA from a glorified address book to a powerful, handheld multimedia computer. And, as always, stop by the CE Pick Of The Month for a look at our favorite item from this issue.

100 CE Lite
On The Lighter Side Of Technology



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The Latest Tracks & Flicks: Are You Not Entertained?

105 Game On
Strap On Your Gloves: These Games Are Knockouts

110 Retroscope
PDAs: The Smallest PC Grows Up Quickly

112 CE Pick Of The Month
Elite Audio At A Less-Than-Elite Price

Web-Only Articles

There's so much going on in the world of consumer electronics that it won't all fit in our magazine, so we're serving up a few extra *CE Tips* articles and reviews at www.cetips.com. If you're a *CE Tips* subscriber (or if you subscribe to *Smart Computing*, *PC Today*, or *Computer Power User*), head to the online table of contents for this issue, and you'll find links to each of the articles mentioned here.

The Radiowave Of The Future
RFID: Panacea Or Orwellian Nightmare?

Hardware Reviews:
Syntax Olevia LT30HV LCD TV
Casio CW-75 CD Label Printer
Kyocera 7135 Smartphone

DVD Movie Reviews:
The Triplets Of Belleville
The Office: The Complete First And Second Series

Editor's Note

Home theater is really taking off, and let's face it: It's easy to see why. Thanks to HDTV, DVD, surround sound, and a number of related technologies, you can come pretty close to duplicating the theater experience in the comfort of your own home where parking is never an issue, there are no lines, and you don't have to fill out a credit app for a box of Milk Duds. Just take a stroll through the aisles of your favorite electronics retailer, and you'll see crystal-clear pictures and theater-quality sound systems stacked to the rafters, all at prices that put great movie viewing within reach of just about anyone.

But unless you're rolling in cash, you'll probably end up installing and setting up most of that equipment by yourself, and it's important to do it right. Once you get everything set up and working, you're really just getting started; honing your system's audio and video settings until they're razor sharp increases your enjoyment of the home theater experience and, therefore, the return on your "investment." And, of course, there are always bugs to squash; things such as compatibility issues, power fluctuations, scratched DVDs, and the like crop up from time to time. The more you know about dealing with such problems in advance, the less time you'll spend troubleshooting when you could be basking in the glow of your favorite movie.

To that end, we submit this month's feature section, which includes 22 pages of home theater setup, use, and troubleshooting advice. If you have a question about getting your home theater working (or keeping it working), it's likely you'll find an answer here, and along the way we're confident that you'll pick up answers to questions you haven't even asked yet.

In addition, this issue contains helpful articles for improving your photography skills, printing better photos, installing your own speaker wire, getting top dollar for your old electronics products at eBay, and much more. You'll also find several pages of product reviews, electronics news, and commentary in these pages, so read on and enjoy.

Chris Trumble, Publication Editor, *CE Tips*

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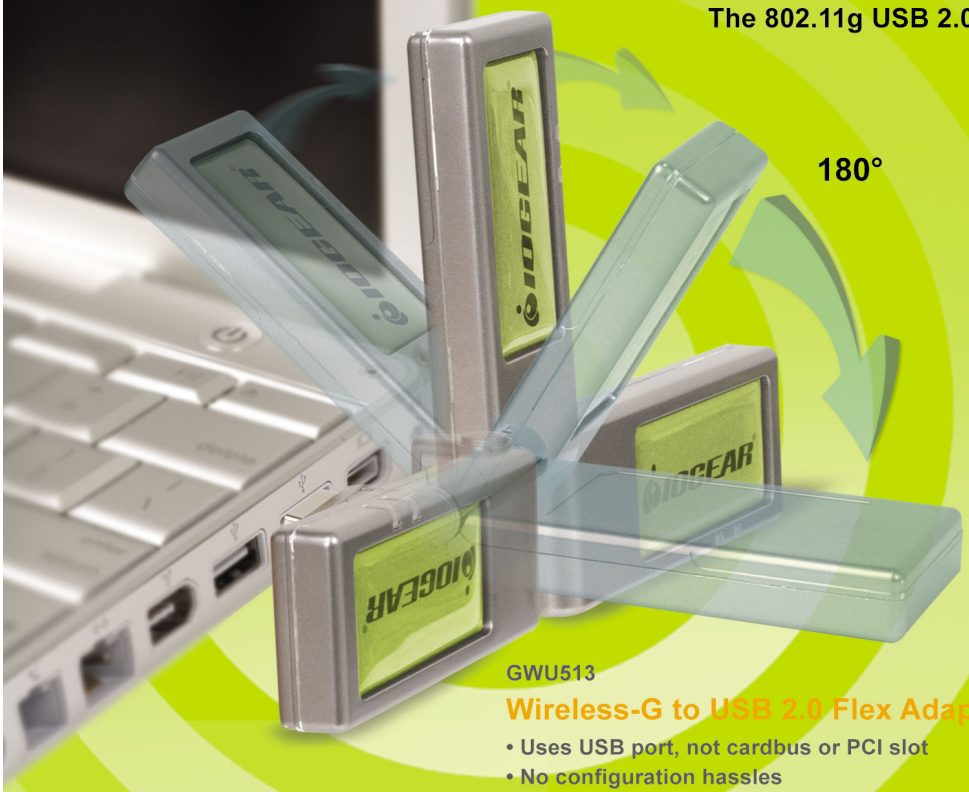

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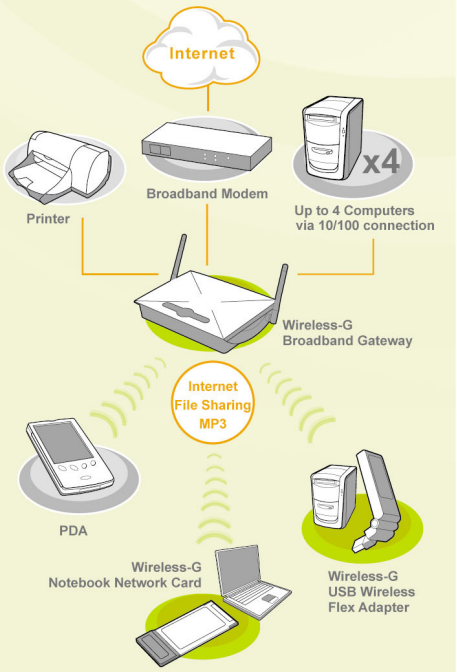

GWA501

Wireless-G Broadband Gateway/Print Server

- Fast setup in just a few simple steps
- Includes everything for effortless installation
- Built-in firewall, supports WPA and WEP
- Built-in print server shares your printer with all connected computers

GWP511

Wireless-G Notebook Network Card

- Low-profile high-gain antenna achieves favorable sleek design
- Included Software Access Point allows you to turn your notebook into a wireless Access Point

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Tech Data

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10 Tips On . . . Editing Digital Video

1 Garbage Out, Garbage In

What you put into your computer is only as good as what comes out of the device you're capturing it from. The first step to editing your video into a strong final product is having good footage in the first place. Video-editing software ships with all sorts of filters designed to sharpen, brighten, and otherwise ameliorate the video, but these features work best on the footage that needs them the least. Through books, magazines (especially *CE Tips*, of course), Web sites, and other video enthusiasts, learn how to use manual and automatic focus effectively, learn how to provide appropriate and sufficient lighting for your subject, and learn how to film from the best angles with the best choice of background. These tips will help ensure you don't have garbage in or out.

2 Digital Camcorders Rock

You don't really need a digital camcorder if you want to work with digital video; it's simply a lot nicer. You can plug in your good old analog camcorder and capture the video from it, but with a digital camcorder, you get a few very useful extras. For one thing, Windows (and the video-editing programs you can get for Windows) recognizes these camcorders and provides an interface that lets you control the camcorder directly: forward, reverse, scene skip, and more. For another, you can capture the video in a sufficiently high resolution, which lets you record the video back onto tape without any loss of signal or quality. If you have a choice, grab a digital camcorder, especially if you intend to edit your footage extensively.

3 Cut Your Video Into Small Clips

Your video-editing software typically begins helping out as soon as you import the footage, dividing the length of the import into several individual clips. You can then manipulate any of these clips by sorting them, moving them from location to location on a storyboard or timeline, adding effects to them, and separating them with transition sequences. For more control over your work, cut the clips into even smaller clips so that you can more precisely work with each small segment of your work. All editing packages provide an easy means of doing so.

4 Start With An Automated Video

Today's editing packages are so willing to help you create interesting videos (or possibly so distrustful of your ability to do so) that they automate the process, much like a bread machine. Just dump in the video files and the

sound files, tell the software what kind of pizzazz you're looking for, and presto! Out comes a fully formed video, complete with transitions, effects, and even image cleanup. As impersonal as this sounds, it gives you an excellent way to learn how to create videos for yourself. Examine the original clips and the original sound files and then look at the automated result to see precisely what the program did. You'll discover that effective videos tend to use short, punchy sequences, along with a smooth but varying audio track. With that example in mind, you can start editing on your own.

5 Think Highlight Reel

Every night your favorite sportscast creates a few seconds of interesting video out of a baseball, football, or hockey game that lasted two-to-three hours. If you can train yourself to pull those hours of wedding or baby video into a short highlight reel, complete with narration and sounds, you've mastered the most difficult part of video editing, the art of selection. Ask yourself which clips are absolutely necessary, focus on a collection in which each clip reveals something different or something new, and give yourself a strict length to work with: five minutes, three minutes, or even one minute. Add narration and sound for even greater effect, and you've started your life as a video *editor*, not just a video compiler.

6 If You Want Good Sound, Buy An External Microphone

Your camcorder picks up sound in addition to video, but the quality of the sound rarely matches the quality of the video. This is primarily because camcorders don't typically include top-quality microphones and secondarily because the placement of the microphone, which is typically attached to the camcorder, is less than optimal. However, many camcorders have a mic input, and you should take advantage of that whenever you want higher-quality audio. Buy a good microphone—expect to spend $80 to $150 or higher for it—and a stand to go with it. Place the mic as close as possible to the subject whose sound you want to capture and get someone to move it to other locations while you film.

7 Give Your Files Memorable Names

As you develop your production, segmenting the video and the audio into smaller and smaller clips, you can quickly reach the point where it's impossible to look at the list of files/clips and determine what's what. From the very beginning of the editing project, rename your clips from within the program, and if they represent individual files, save them with names that tell you at a glance what they contain. Some video editors give you an information screen for the clips; use these to your advantage, giving details about the content of the clip, any special effects or transitions you used, and any plans you had for the clip when you finally place it. Don't get caught up in the rush of making the video. Slow down and give yourself the information you'll need to smooth the process later.

8 Don't Transition Your Video To Death

With many transitions at your disposal, you can easily yield to temptation and use a whole variety of them. They're a bit like fonts back in the early days of WYSIWYG (What You See Is What You Get) displays when writers created thousands of almost unreadable printouts because it was so fun to play with the typefaces. Transitions do one thing only: They help your viewers perceive that one scene has become another, avoiding the jarring effect of one image instantly replacing another. Professional films tend to restrict transitions to only a pair: fade to black and fade in from black. By all means, spice your own up with a bit more variety, especially if your audience consists of friends or family, but unless you're trying for an intentionally humorous effect, avoid making the transition sequences the focus of the entire production.

9 Shift An Event's Contents

Sony Screenblast Movie Studio 3 ($99.95; mediasoftware.sonypictures.com/Products) features slipping and sliding of events, two techniques that let you, in effect, overlay the video contents on the timeline and change the position of either the timeline or the contents without affecting the position of the other. Other editing programs allow similar editing techniques under different names. The idea is that instead of cutting the clips to match events, and then undoing the cuts if you want to experiment, you can place the event on the timeline and shift one against the other until you get precisely the contents you want at the specific location you want. This way, as you continue to edit the video, you can experiment without sequences quickly and easily.

10 Use Text & Narration To Tell Your Story

A text screen between two scenes acts as a guidepost for viewers, helping them get the point of what you're trying to show them. Place one when you think the audience may not immediately know what the next scene represents, although, for obvious reasons, don't overuse them. Use the narration track (which all of today's editors offer) to record a vocal overlay for the video, again to work as a set of guideposts, but rehearse your narration before recording it to ensure it doesn't get unwanted attention. If you can't stand the way your voice sounds (many people can't), get someone else to read the narration and record it with the best mic you can get your hands on, giving it a dash (and just a dash) of reverb to make it sound professional. CE

BY NEIL RANDALL

Subscribers: For an additional five tips on Digital Video Editing, see our online article ("10 Tips On . . . ") at www.cetips.com/digitalvideoediting.

CE News

Compiled by Tracy Baker

THX Select On A Budget

Home theater is bigger than ever, with HDTVs selling in droves, so it's fitting that A/V receiver prices come down even as their features expand. Kenwood's new VR-8070 shatters most price vs. features expectations with 7.1-channel output, 700 watts of power,

and THX Select certification for a retail price of $600. THX Select is a step down from THX Ultra and THX Ultra2 certification (found on much more expensive products) and means that THX has tested the product and found it reproduces movie soundtracks at reference levels in rooms that are 2,000 cubic feet or smaller. (Figure a room's cubic feet by multiplying the length x width x height.)

The receiver has a host of other features, including a 24-bit/96KHz DAC (digital-to-analog converter) and component video switching that changes the video input according to the device that is active. It decodes all of the major surround sound formats including Dolby Digital, DTS-ES, and Dolby Pro Logic IIx. This last format upconverts stereo output into 7.1 channels of surround sound audio. The receiver also upconverts composite video input into S-Video output for improved picture quality and has five composite, five S-Video, and three component video inputs total. It comes with a universal remote control and is available in both silver and black. ▮

Handheld Gaming: New Products, New Competitors

Sony and Nintendo unveiled their upcoming handheld game consoles at E3 2004, with radically different designs. Sony's PSP (PlayStation Portable; price not available; www.us.playstation.com) has a fairly traditional design. A 4.3-inch color LCD dominates the face, and it has a digital control pad on the left and four input buttons on the right. With 32MB of main memory and 4MB of video memory, the PSP is nearly as powerful as a PlayStation 2 console. The PSP uses proprietary optical media, UMDs (Universal Media Discs), which store 1.8GB; movies will be available in this format when the PSP launches. The unit has 802.11b wireless connectivity, and Sony promises digicam and GPS add-on modules.

The upcoming Nintendo DS (price not available; www.nintendo.com) has a clamshell design like the GameBoy SP, but it's wider and has two 3-inch LCDs. The top screen is a color LCD, while the bottom uses touchscreen technology similar to a PDA. For example, an upcoming Mario game lets players draw objects on-screen to slow down a falling Mario. The new unit will be backward-compatible with existing GameBoy Advance titles. It has 802.11b wireless connectivity along with a proprietary wireless protocol developed by Nintendo that lets DS units communicate directly with one another.

Both units are expected to hit retail shelves in March 2005. ▮

Axonix MediaMax: All-In-One A/V Output

The MediaMax from Axonix ($3,795 and up; www.axonix.com) uses Ethernet network connectivity to deliver multimedia to up to four rooms via included set-top boxes. The basic MediaMax unit is a file server that stores DVDs, recorded TV programs, camcorder video, digital music and photo files, and nearly every other PC file with audio or video. The MediaMax rips DVDs directly to its internal hard drive, which has enough capacity (250GB) to store about 20 DVDs. The optional MediaStore external storage is available in capacities ranging from 250GB up to 1TB (terabyte; $995 to $4,995), enough space to store 160 DVDs. Attach multiple

MediaStore units to the server to allow for virtually unlimited storage capacity.

Content you store on the MediaMax unit or in a MediaStore module can be delivered to the included set-top boxes; additional set-top boxes are $299. The drives play DVDs in MPEG-2 (Moving Picture Experts Group-2) digital video format, and they preserve the digital surround sound of the soundtracks. Axonix has a Gold version of its MediaMax server so you can play PC games; it has a faster processor and comes with a CD/DVD recorder for archiving files. ▮

Forget The Set-Top Box

Leasing a set-top box from the cable company may soon be a relic of the past; this summer several TV sets will ship with integrated digital cable hardware. These sets, dubbed "Digital Cable Ready," will be marked with a DCR logo and will have the ability to decode standard digital cable channels, as well as HDTV cable channels. The sets will also have standard ATSC (Advanced Television Systems Committee) tuners for receiving over-the-air broadcasts.

Just because the new sets have a digital cable box integrated into their innards doesn't mean their owners will get free access to digital cable. DCR televisions have a slot where subscribers can insert their unique CableCARD that identifies them as a subscriber. CableCARDs are slated to be available on July 1, 2004, the day an FCC mandate kicks in that requires all cable companies with digital cable capabilities to comply with DCR standards. ▮

Sony Announces "Wireless" Dream System

Sony's Dream System line has always offered some of the most stylish home-theater-in-a-box products, and its new DAV-LF1 ($2,000; www.sony.com), available in September, ups the aesthetic ante with its sleek design and (sort of) wireless speakers. The core of the new system is a DVD/CD/SACD (Super Audio CD) player that incorporates frosted glass and delivers power to the five included speakers. You can mount all of the speakers on a wall (horizontally or vertically), and you'll also be able to mount the left- and right-front and rear speakers on optional floor stands.

The rectangular speakers are finished in brushed aluminum, and the front three speakers, along with the subwoofer, connect to the receiver with wires, as usual. The two rear speakers require a power cord and connect to one another via a wire, but you don't need wires to connect them to the receiver, thanks to Sony's DIAT (Digital Infrared Audio Transmission) technology. Sony claims that this wireless transmission method is immune to the interference that plagues wireless transmissions based on radio waves and that it delivers true uncompressed audio to the rear speakers so that sound quality is not compromised. ▮

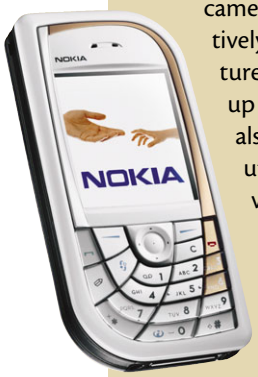
Totem Drum Makes Music More Moving

You have the big speakers and the massive receiver that draws enough power to send the meter out back spinning like a top, but do you have a Totem Drum? This small aluminum cylinder from Totem Acoustic ($450; www.totemacoustic.com) houses a powerful subwoofer that has its own amplifier (sold separately; $450 to $500 depending on finish). Slip it between the cushions in your couch, and it kicks out frequencies from 150Hz all the way down to 10Hz that shake the house in tune with music and movie soundtracks for better theatrical immersion. Many products in this category rumble only on two frequencies.

The external amp can power two Totem Drums if you want to give guests a kick in the pants. The subwoofer handles 100 watts of continuous power and has a 400-watt peak power, so hold on to your popcorn. ▮

Nokia 7610 Encourages Sharing

If you're one of the few people left who doesn't maintain a blog, chronicling every excruciating detail of your life, Nokia's 7610 may bring you around. It's due to reach the United States in the second quarter of 2004 (pricing not available; www.nokiausa.com). The camera phone, currently available only in Europe, Africa, and the Middle East, incorporates a 1MP (megapixel) digital camera that takes relatively high-quality pictures at resolutions of up to 1,152 x 864 and also records 10 minutes of full-motion video. The fun part is that you don't just have to admire images on the phone's 64,536-color LCD, you can also easily upload the pictures and video clips to your Nokia Lifeblog. This online service is intended to serve as a sort of photo diary, giving family, friends, and strangers a literal glimpse into your life.



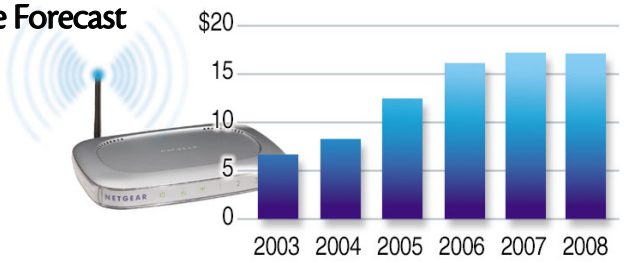
The phone will come with software that lets you play the part of director by editing and combining still images, video, clips, voice recordings, and text messages to create mini-movies. It can access SMTP (Simple Mail Transport Protocol), POP3 (Post Office Protocol 3), and IMAP4 (Internet Message Access Protocol 4) email accounts; it sports customizable wallpapers to personalize the display; and it comes with dozens of polyphonic ringtones. ▮

Consumer Electronics Marketplace

Home-Networking Equipment Sales On The Rise

Home networking continues to become faster, more convenient, and more affordable, and this burgeoning market is expected to continue growing at a rapid pace throughout the next four years. According to a recent In-Stat/MDR report, the total value of the home-networking market (which includes all products containing home-networking connectivity) will rise from $8.3 billion in 2004 to an estimated $17.1 billion by 2008. Much of this growth is driven by the desire of home users to share a broadband connection between multiple computers and devices. The report also found that the popularity of relatively fast and backward-compatible 802.11g devices accounted for nearly 50% of sales in the fourth quarter of 2003, meaning the popularity of 802.11b technology is waning. ▮

Home Network Total Device Revenue Forecast
(US$ In Billions)

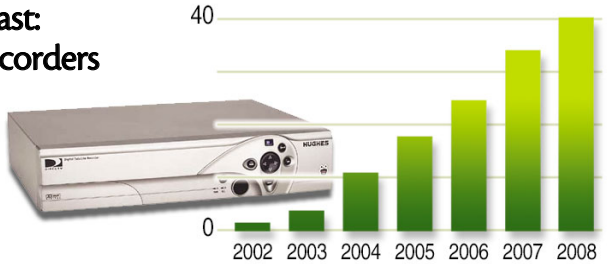


Source: In-Stat/MDR

DVRs Get Popular

The convenience of pausing live TV and automatically recording programs is finally catching on with consumers, and DVR (digital video recorder) sales are surging. 2002 shipments of 1.5 million units tripled to 4.6 million units in 2003, and that figure is on track to more than double in 2004, thanks to the popularity of PVRs that combine hard drives and DVD recorders. By 2008, In-Stat/MDR predicts that shipments will reach 40 million units per year. ▮

Worldwide Unit Shipment Forecast: Digital Video Recorders
(Units In Millions)



Source: In-Stat MDR

Tidbits

5,930,010 mobile devices shipped in the first quarter of 2004, compared to 4,208,890 units in the first quarter of 2003.

Source: Canalys Study

Nokia mobile phones enjoyed a **29.3%** market share in the first quarter of 2004; Motorola had 16.6% and Samsung 13.1%. Siemens and Sony Ericsson trailed with 8.4% and 5.8%, respectively.

Source: IDC

37% of television owners who don't have an HDTV plan to buy one in the next two years.

Source: Consumer Electronics Association

By May 18, nearly 10 years after the PlayStaion debuted, more than **100 million** PlayStation and PS One consoles had been sold. The PlayStation has more than 7,300 games, which, combined, have sold more than 949 million copies.

Source: Sony

Micro fuel cells, which use gases such as methanol to create electricity, are expected to power **10% to15%** of all notebook computers by 2004.

Source: ABI Research

By 2009, mobile video service will account for **14.9%** of all wireless data revenue, with 22.3 million Americans viewing mobile video content and 33.1 million using video-messaging services.

Source: In-Stat/MDR

The removable solid-state storage market generated **$4.25 billion** in revenue in 2003, thanks mainly to flash cards and USB flash drives.

Source: Gartner

IT'S SHOWTIME

DIGITAL MOVIE™ DVD

Talk about box office hits. Verbatim's new DigitalMovie™ DVD recordable media is so hot you can almost smell the popcorn. Available as DVD-R or DVD+R, this 4X speed DVD media looks – even feels – like a Hollywood movie reel. But don't think you need a director's chair to use them. These mini-reels are perfect for home movies, business presentations, transferring files – anytime you want to add a little fun to the show. And of course, DigitalMovie DVD has the same unsurpassed performance and reliability you've come to expect from Verbatim. So make your next show a feature presentation. DigitalMovie DVD from Verbatim. It's the reel thing. For more information, contact us at 800-421-4188 or online at www.verbatim.com.

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ShelfWatch

A Look At The Latest Consumer Electronics

Go faster longer. That's the promise of these new products that each in their own way aim to increase speed and endurance. How's that for cross-training?

BY *Gregory Anderson*

Alpine IVA-D300 Mobile Multimedia Station

$1,500

www.alpine-usa.com

In-car multimedia is hitting its stride. Family movie watching is no longer a strictly at-home affair. The Alpine IVA-D300 makes long trips more tolerable and, with fewer stops, may even help you reach your destination faster. The DVD-compatible head unit with 7-inch LCD screen and the 18-watts-per-channel (rms; root mean square) amplifier provides all the in-car entertainment you'll ever need. The screen's PulseTouch technology makes navigation easier by providing pulses and sounds when you touch the screen.

Casio Exilim EX-Z40 Digital Camera

$399.99

www.casio.com

Casio's latest Exilim promises two and a half times the battery life of current models. Its 1.8v low-power system supports up to 360 photos on a single charge. The 4MP EX-Z40 supports both MMC (MultiMedia Card) and SD (Secure Digital) cards and includes 9.7MB of built-in flash memory. PictBridge technology makes it easy to print directly to compatible printers, without stopping to hook up to a PC. Its 1.6-second startup time and 4-ounce weight won't slow you down, either.

Canon CP-330 Photo Printer

$279

www.canonusa.com

For printing on the go, check out Canon's new CP-330. The dye-sublimation photo printer churns out 4- x 6-inch or 4- x 8-inch prints in just 85 seconds, and the rechargeable lithium-ion battery is rated for 90 minutes of use. PictBridge-compatible cameras print directly from memory (via USB cable), and you can use their LCD view screens to control photo and print settings. At 30 ounces and just 2.2 inches x 6.7 inches x 4.8 inches, the CP-330 is small enough to carry wherever you're shooting.

Canon PowerShot Pro1 Digital Camera

$999

www.canonusa.com

The PowerShot Pro1 Digital SLR (single-lens reflex) uses Canon's proprietary DIGIC (Digital Imaging Core) chip processor, which promises faster times and longer battery life. The interchangeable L-series 28mm to 200mm lens feeds an 8MP (megapixel) 2/3-inch CCD (charge-coupled device) sensor, creating images up to 3,264 x 2,448 pixels (the highest resolution of any PowerShot model). The 7X optical zoom, 3.9-inch full-resolution macro mode, and 1.2-inch 5MP Super Macro mode let you get up close and personal.

Belkin Wireless Keyboard And Optical Mouse Bundle

$84.99

www.belkin.com

Forget about running cables across your desk and behind your computer. Don't waste time figuring out how to integrate a keyboard and mouse into your new media center. Just plug in the included wireless RF receiver (USB or PS/2) and start pointing, clicking, and typing. The Wireless Keyboard And Optical Mouse bundle makes it easy to compute from wherever you're sitting and avoids worsening the rat's nest of cables behind your desk.

Olympus C-8080 Digital Camera

$1,149

www.olympusamerica.com

Olympus' new 8MP contender, the C-8080, stakes its claim to glory on speed and lens quality. The TruePic TURBO image processor promises faster start up and quicker recycling and stores images on xD-Picture Card or CompactFlash media. Transfer images to a PC via USB 2.0, to a television with A/V cables, or directly to a PictBridge-enabled printer. The all-glass lens supports f-stop settings from 2.4 to 8.0 and offers 5X optical zoom. And if the standard lens isn't good enough for you, Olympus offers dedicated wide-angle and telephoto accessory lenses ($220 to $240) designed specifically for the C-8080.

Onkyo LS-V955 Home Theater System

$1,000

www.onkyousa.com

The less time you spend fiddling with your home theater system, the more time you have to actually watch movies. And Onkyo's LS-V955 provides a vehicle for watching flicks all night long. The 5.1-channel system includes a combination receiver-DVD player, outputting 40-watts-per-channel (rms) sound and progressive-scan images, plus aluminum satellites, subwoofer, and center channel.

Panasonic RP-WF930 Headphones

$99.99
www.panasonic.com

Wireless surround sound headphones have been the domain of super-expensive, high-end audio components. Until now. Panasonic's RP-WF930 makes it possible to continue enjoying full home theater action after the kids and neighbors have gone to bed. The multichannel 900MHz radio transmitter constantly monitors and switches channels to avoid interference. With a range of up to 200 feet and 20 listening hours of battery life, you won't be held back by cords or chargers.

PalmOne GPS Navigator

$299
www.palmone.com

You don't need a separate GPS navigation system to get around. You just need a Bluetooth-enabled PalmOS device and PalmOne's newest accessory—the GPS Navigator. The package includes a Bluetooth-enabled GPS (global positioning system) dashboard receiver, TomTom Navigator software (providing maps, directions, and points of interest throughout the United States and Canada), a docking cradle, and charging cables. PalmOne currently offers two Bluetooth-enabled models (sold separately): the Tungsten T3 and new Zire 72.

Syntax Olevia 30-inch LCD TV

$1,799
www.syntaxgroups.com

Looking to speed up your entrance into the world of HDTV? Need a technology that has staying power? Syntax promises to help you do both with a line of HD-ready LCD televisions that put crystal clarity and thin profiles within reach of most consumers. The Olevia models (the 27-inch model is $1,299) display widescreen 768 progressive-scan images with 750:1 contrast ratios and 16ms response times. Dual NTSC (National Television Standards Committee) tuners and DVI-HDCP (Digital Visual Interface-High Bandwidth Digital Content Protection) inputs provide plenty of programming options now and into the future.

Shuffle

Security Worries Worth Sneezing At

Commentary by
Sascha Segan

Someday, a virus may prevent you from getting out of bed in the morning. No, not the flu. A computer virus.

When the Sasser worm swept the country this May, it canceled flights on Delta Airlines and shut down hospital computers in New Orleans. It also trapped thousands of people who thought they'd done everything right—they didn't open mysterious attachments, they updated their copy of Windows regularly, and they owned antivirus software.

Sasser's part of a relatively new wave of viruses and worms that can infect your PC without you doing anything wrong. You don't have to go to a poison Web page or download an evil file; they worm their way through holes in your PC's OS.

Microsoft sends out patches to fix security holes, but virus writers are getting faster and faster at taking advantage of weaknesses. Many home users patch their systems once a month or so; Sasser hit 18 days after Microsoft announced a patch.

As more home electronics connect to the 'Net, they become vulnerable to Sasser-esque worms. I'm not talking about using a Microsoft Media Center PC to manage your home entertainment. Those PCs are already vulnerable to Sasser and its ilk.

Not The Refrigerator!

I'm talking about gadgets you never thought could get viruses. Take TiVos. TiVos are just Linux-based computers that hook up to your TV. The original TiVo was pretty safe because it dialed its mothership directly through your phone line, but newer models use your broadband Internet connection; and the rule is, if it connects to the 'Net, it's theoretically vulnerable. Gateway's Connected DVD Player and Microsoft's Xbox both run their own proprietary OSes, but they're networked PCs, too.

In your bedroom, Westinghouse's Beyond alarm clock uses a version of Microsoft Windows to pull news and weather off the Internet. And in your kitchen, well, appliance manufacturers have been offering Web-connected fridges for quite a while (though they haven't caught on).

I asked two virus experts, Brian Dempsey from Symantec and Chris Kraft from Sophos, when we might see viruses hitting consumer electronics. They couldn't say because the technology to attack your networked gadgets is already out there. Just because no viruses have attacked TiVos doesn't mean they aren't vulnerable. Virus writers just don't seem to care about attacking anything other than Windows PCs. That's "security through obscurity," and it's a worrisome way to live.

A Fortress For Your Gadgets?

How do you protect yourself? Obviously, there's no antivirus software to load onto your TiVo. You can, though, put a lock on the virtual front door of your home network. Buy a firewall, a box that sits between your cable or DSL (Digital Subscriber Line) connection and your network hub or PC. Or use a network router, such as Apple's AirPort or several models from Linksys, that includes a firewall. Those routers all prevent hackers from sneaking into your network, and firewalls protect PCs from viruses, too.

If all you have is a PC with a dial-up connection, you can buy firewall software, such as ZoneAlarm or Symantec Internet Security, to protect your PC (but nothing else in your house).

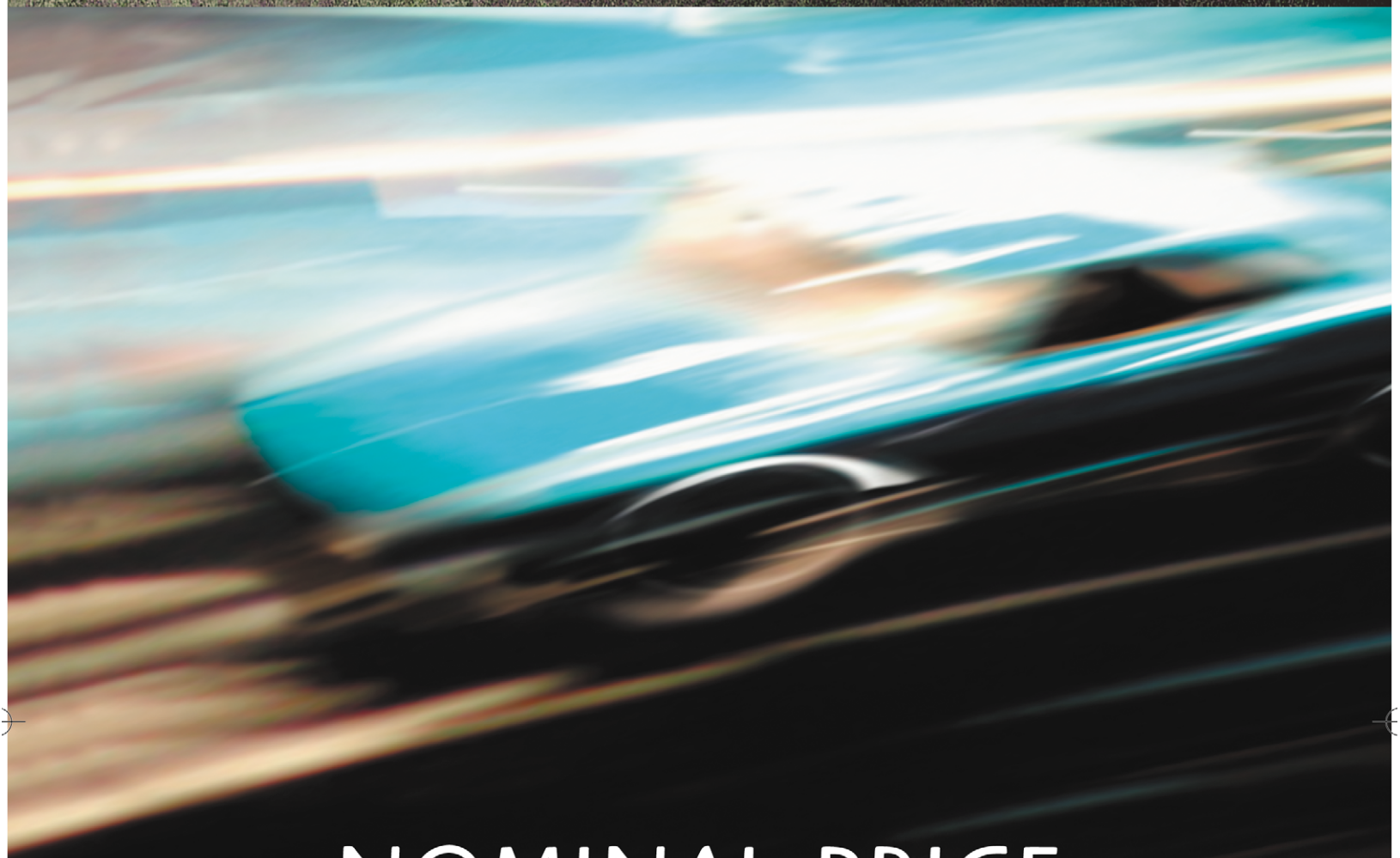
Kraft also says computer and CE manufacturers are starting to take security seriously, and that bodes well for being able to rely on your Internet-connected alarm clock to wake you. Over the next five years, Kraft says, programmers will rewrite OSes and applications from the ground up to protect themselves. Windows XP is more secure than Win98 was (believe it or not); the new Windows Longhorn will probably be even more secure than that.

That's good, because homeowners shouldn't be required to act like corporate IT departments just to prevent some virus-writing idiot from spoiling their days. Computers and electronics should just work; you shouldn't have to worry about whether you downloaded the SAS vulnerability patch or even what the SAS vulnerability patch is.

For now, making sure you're using a firewall seems as sensible as having a lock on your front door, and as easy. And setting WinXP to automatically update itself (go to Control Panel, System, and Automatic Updates) can help protect your computer, too.

That way, the only virus that'll keep you in bed will be the human-affecting kind. CE

MAXIMUM PERFORMANCE



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Slick new displays and HDTV get all the attention, but your eardrums need love, too. Forget your eyeballs for a minute and bask in some sweet sounds.

COMPILED BY GREGORY ANDERSON

Canton Karat CL 400

$900 • www.cantonusa.com

Canton's newest center channel loudspeaker encloses two 7-inch concave aluminum woofers and a 1-inch aluminum-manganese tweeter. One driver handles bass only; the other handles bass and midrange frequencies, creating a "2.5-way" design. However it gets there, the CL 400 has a frequency response of 26Hz to 30KHz, which should cover the lowest lows and the highest highs from just about any track.

Gibson Audio Wurlitzer Digital Jukebox

$1,899 • www.gibsonaudio.com

What are you going to do with 1,000 CDs? Rip them to the Wurlitzer's 80GB hard drive and play them anytime or mix and match tracks to create new discs with the built-in CD recorder. USB 2.0 connections help you hook up with external hard drives or portable music players. The built-in Klipsch speakers and subwoofer take care of the audio, and the Wi-Fi enabled touchscreen remote controls the system from anywhere in the house.

Thorens TD 850

$1,999 • www.thorens.com

You haven't gone through the hassle of rescuing and storing all that vinyl just to waste it on a tinny, wobbly, cheap turntable, have you? Thorens' belt drive system and 24mm thick aluminum platter will spin those sides the right way. The deck is a sandwich of wood and steel, floating on dampened adjustable feet. It might not be exactly what Miles Davis had in mind, but without options like these, we'd certainly feel kind of blue.

Magnum Dynalab MD-108

$5,850 • www.magnumdynalab.com

If FM is your thing, you definitely need to touch these dials. Magnum Dynalab's MD-108 FM Tuner combines analog and digital technology to deliver extraordinary signal sensitivity and audio quality, times four. Two analog antenna jacks and another pair of digital inputs provide plenty of options, and the three-way bandwidth settings make it easier to restrict interference. At 40 pounds, it's not exactly portable. But it will make your other components stand up and take notice.

Sony Qualia 017

$1,900 • www.sonystyle.com

Sony's new Qualia line of vanity A/V products gets rolling with the 017, an ultra high-end MiniDisc player. Whether or not you're a MiniDisc aficionado, you have to appreciate Sony's chutzpah. Each Qualia 017 is made from a solid brass block, providing strength as well as style. The charging stand and in-line controls are works of art in their own right.

GADGET Envy

House Proud

Compiled by Sascha Segan

Tech isn't just for the living room any more. In Europe and Asia, they're forging ahead with new technologies for the kitchen, garden, and even the laundry room. Take a good look at these futuristic appliances because they just might crop up on this side of the pond someday.

Good Old-Fashioned Networking

Toshiba's Feminity line is a good example of classic home networking taken to the next level. Sold in Japan, the Feminity line includes a wireless, tablet-style home control panel, a smart fridge, smart microwave, and smart washing machine. If you have the whole suite, you can punch the contents of your fridge into the panel, send shopping lists to your cell phone, or program the microwave with a recipe involving the food you have in the house. Meanwhile, you can enter in your wardrobe on the panel, and it'll tell the washing machine the appropriate cycle to use for your fabrics and colors. You can even wander around with the control panel, as everything's connected with Bluetooth—there are no wires to hook up. And, this being Japanese, everything's terribly cute. Just look at that control panel.

Electric Sheep

Think of the Electrolux Automower ($2,398) as a Roomba for your lawn. Europeans don't usually have the great expanses of greenery found outside most American homes, but they do like to keep their lawns neat. The Automower works like a robotic flock of sheep. You leave it outside your house, and it putters around your lawn for a few hours each night keeping things properly trimmed. Homeowners run a special wire along the outside of the lawn and around their flowerbeds to prevent the Automower from taking over the neighborhood. One big downside: The Automower chokes on stray toys, so your kids better be robotically neat, as well. Right now, the Automower is only available in Europe.

Keep Things Cool

Here's a gadget you probably rarely think about: your electricity meter. In Holland, customers of the Nuon power company have an unusually close relationship with their electric guys. These high-tech meters designed by U.S. firm Echelon warn you to turn off your air conditioner when the local power grid is being strained. In case of a potential blackout, the power company can turn off houses one by one rather than knocking out whole neighborhoods. And when it gets too hot or too cold, Nuon makes sure everyone has electricity—even customers who are behind on their bills. Various regulatory problems mean we're not likely to see these kinds of meters in the United States for a while, says Echelon's Director of Corporate Marketing Steve Nguyen, and because the electric company buys the meters, there's no retail price available.

Radio TiVo

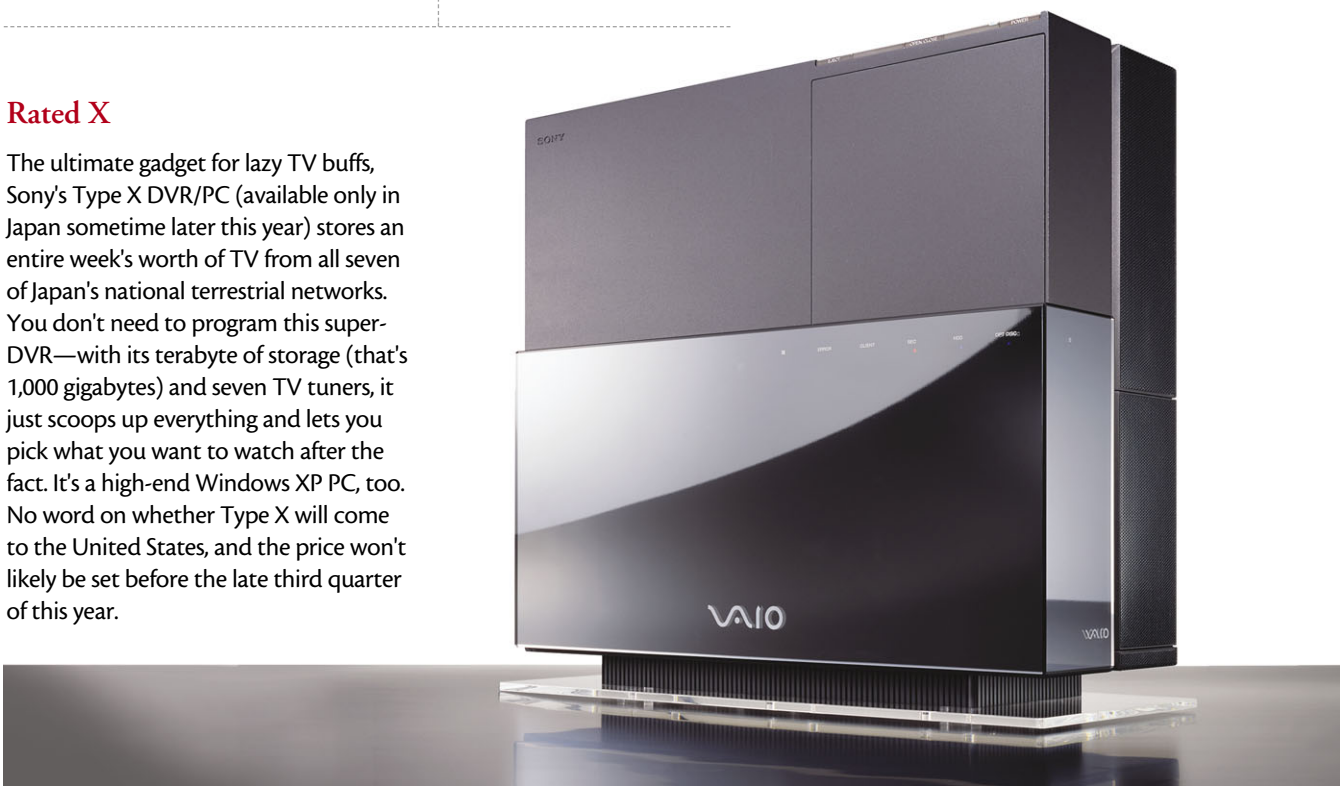
Pure Digital's Bug radio ($262) may be the ultimate bedroom alarm clock. Not only can it pause, rewind, and record live radio to a Secure Digital card, kind of like a TiVo for radio, but it also always shows the right time (getting the time from a digital radio signal), wakes you up to radio or MP3s, and displays news and sports results on its attractive blue screen. The Bug is the latest digital radio to hit the United Kingdom, where they're way ahead of us in new radio technologies. Most of the United Kingdom is covered by dozens of channels of free, crystal-clear digital radio, which you can get even inside buildings—unlike our for-pay satellite systems and still-embryonic HD Radio.

Really Agitate Your Clothes

Dyson reinvented the vacuum cleaner with its high-tech units that don't lose suction even when they're full. (Dyson's also working on a Roomba-like robo-vacuum.) Now the company's trying to reinvent the washing machine in the United Kingdom with its 2-Drum Flowcheck Washer ($1,406). All other washers have one rotating drum. This one has two, rotating in opposite directions, each taking up half the depth of the wash chamber. Dyson says that creates a cleaner, faster wash because clothes are continually being picked up and tossed around, not just riding around the chamber until they fall to the bottom.

Rated X

The ultimate gadget for lazy TV buffs, Sony's Type X DVR/PC (available only in Japan sometime later this year) stores an entire week's worth of TV from all seven of Japan's national terrestrial networks. You don't need to program this super-DVR—with its terabyte of storage (that's 1,000 gigabytes) and seven TV tuners, it just scoops up everything and lets you pick what you want to watch after the fact. It's a high-end Windows XP PC, too. No word on whether Type X will come to the United States, and the price won't likely be set before the late third quarter of this year.



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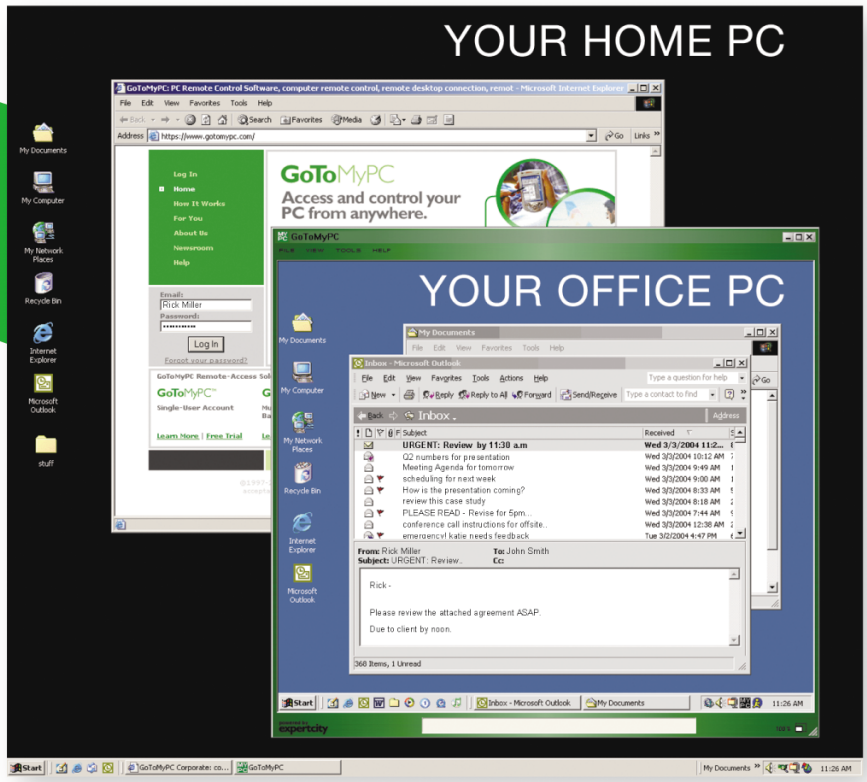

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AV Project

DIY Custom-Length Speaker Wire

Watching a good movie in a properly set up home theater can be a thrilling and enjoyable experience. With the advent of low-cost, high-quality components and speakers, as well as the all-in-one home-theater-in-a-box products, more and more people are turning on to the joys of home theater than ever before.

A few simple parts and tools are required for do-it-yourself custom speaker wire.

The single biggest obstacle to setting up a home theater system (aside from your budget) is whether the sight of the speakers, wires, or components will mar the look of your living room. Although some of the latest equipment uses brushed aluminum surfaces and beautiful wood veneer to match just about any décor, the problem of messy speaker wiring remains. Fortunately, you can fix this problem yourself by buying inexpensive wire, cutting it to the appropriate lengths and installing it in your home theater for a neat, finished look that blends in as much as possible with the furniture. (For more information on keeping wires and cables in the background, see Greg Anderson's "All Tied Up" on page 48 of the July issue of *CE Tips*.)

The familiar RadioShack spool of speaker wire is sufficient for many smaller home theater systems.

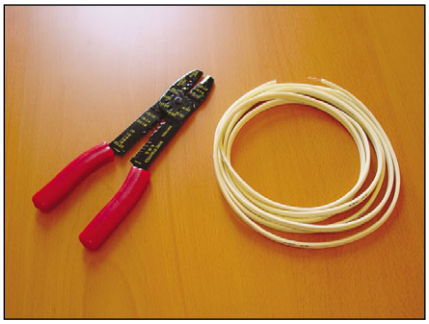
Types Of Speaker Wire

There is a myriad of different brands of speaker wire on the market. The most obvious distinguishing factor among speaker wire products is the gauge or thickness of the wire. Lower numbers indicate thicker wire. For example, the thin speaker wire that comes free with low-end stereo systems is often 18-gauge or thinner, whereas high-quality stereo systems use 16-gauge wire or thicker. The general rule is that the longer the run of speaker cable, the thicker the gauge should be. If you're planning to set up a room using less than 40 feet of wire, 16-gauge should be adequate, but if you're going to be setting up multiple rooms and intend to use more than 40 feet of wire, go with 14-gauge.

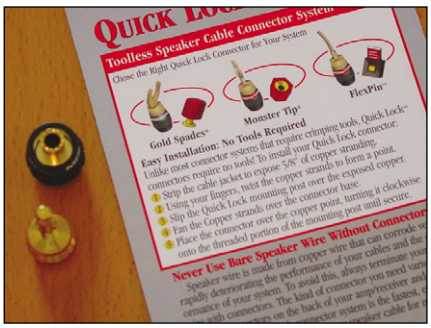
If your wire is too thin, sound quality, especially bass, will suffer. This won't be a problem for the tiny satellite speakers often used in 5.1 systems, but if you are using expensive, higher-end audiophile speakers, the gauge and quality of the speaker wire will have a greater impact on the sound quality. (See the "Wire Quality" sidebar for more information.)

Home-theater-in-a-box systems often come with inexpensive, light-gauge speaker wire to get you started. However, separate components generally do not come with speaker wire, so keep that in mind when budgeting for a new system. In either case, test your system by hooking it up as is, so you can get an idea of how the system sounds in your room before you commit to cutting and installing wire. Advice on speaker placement is beyond the scope of this article (see A/V Project in the May 2004 issue of *CE Tips* on page 46 for more information about speaker placement), but instructions often come in the box with the system.

For good looks, use invisible-wire products, such as Monster Gauge Super-Flat speaker wire ($34.99 for a 50-foot spool with eight angled gold pins; www.monstercable.com). Although more expensive than normal wire of comparable lengths, SuperFlat is white and, with the use of proper clips, can be virtually invisible when you run it along baseboards and up walls in the middle of a room. Hiding cable is of particular importance for surround speakers that are mounted along the side walls at ear level, as opposed to on stands behind the main



An inexpensive wire-stripping tool and bare coiled speaker wire.



Monster Cable sells sturdy connectors such as these gold tips.

seating position. If you already have speaker stands, use regular cable tied neatly along the base of the stand. If you are buying new stands, look for models that let you hide the wire in the shaft of the stand.

Measure Lengths

When buying speaker wire, be sure to get the right length. This might seem obvious, but you may need much more wire than you initially think you do. The distance from your surround amplifier to the left speaker might be 20 feet, for example, but when you account for first running the wire to the baseboard behind the amp, to the corner of the room, to the spot along the side wall behind the seating position, and then 5 feet up the wall to the speaker mounting bracket, you might end up needing 40 feet of wire or more.

To figure out how much wire you'll need, run a piece of string from the amplifier to each intended speaker location. Allow for a couple of feet of give, which you can drop behind the amplifier and out of sight. Plan for extra wire in case you need to move the equipment rack to get behind it later on; you don't want to put any strain on the connections to the amplifier. Avoid running a wire across the middle of a floor. Although you could use a thin plate to cover it, it is much better to run a longer length of wire around the edge of the room, for looks and for safety.

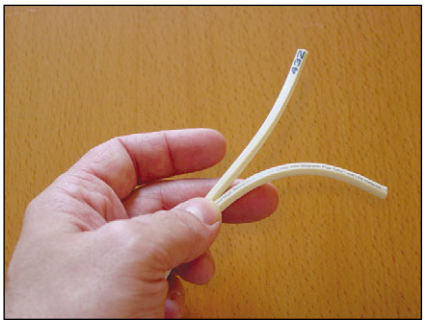
You can also use a tape measure to measure from the floor to higher up near the ceiling.

Connectors

There are several kinds of connectors on the backs of speakers: spring-loaded terminals and five-way binding posts are the most common. Connec-tors on the speaker wire side include banana plugs, spade lugs, and angled pins. Normally, when you connect speaker wire to the terminals (or connectors), you don't need to solder them; use inexpensive crimping tools or self-crimping connectors.

Buy speaker wire and clamps that match your wall color for a seamless look.

Nothing is preventing you from connecting bare speaker wire to the terminals, but using the proper connectors guarantees a secure connection, it prevents you from accidentally crossing the positive and negative leads, and it makes things easier if you need to disconnect or move the system for any reason. Always turn off power to all of your components before making any connections; otherwise you risk damaging your amplifier and speakers.



Before stripping the wire, separate the positive and negative leads.

Buying a stripping tool and the proper connectors will make your wiring system neater and easier to connect.

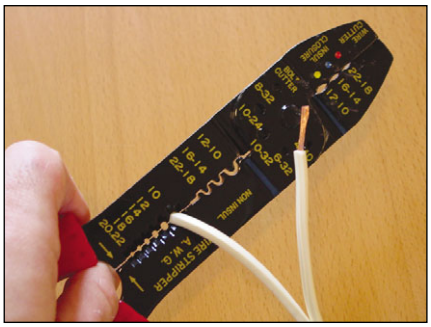
Some models of speaker wire have preattached connectors. If the thought of twisting bare speaker wire doesn't appeal to you, and the available lengths are exactly what you need, consider buying this type of wire. Just be aware that you cannot customize the length of these wires without cutting and splicing, which would defeat the purpose of the preattached connectors.

Strip, Terminate & Install

There are several kinds of wire stripping and crimping tools on the market. The better tools have premachined holes for different sizes of speaker wire, such as 12-gauge and 14-gauge. In addition, there is a more expensive tool by S&G ($18.99; available at www.crutchfield.com) that lets you set the length of wire you want to strip using a built-in ruler in the tool; you then strip the wire in one motion by pulling the trigger. Using a premachined stripping tool is the neatest and easiest way to strip wire, but the tool is expensive, and unless you do a lot of rewiring around your house, you probably won't get much use out of it.

Don't be afraid of cutting the wire that comes with home-theater-in-a-box systems. Unless the wire also has proprietary connectors attached, you can easily cut the wire to fit your room properly. The included wire is usually inexpensive and easy to replace if you decide to move the system to a larger room later.

Stripping and terminating wire is pretty simple. First, measure the right length of wire and cut as necessary. Next, pull the two sides of the wire apart. Use a wire stripper to strip approximately one-half inch from each end of the wire. Twist the wire tightly, about 10 times, so that stray strands don't become loose and cause a bad connection, or worse, prick your finger while you are connecting a speaker. Finally, attach the appropriate plug to the wire, either crimp the connector or

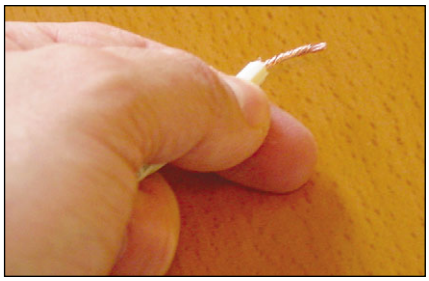


Use a wire-stripping tool with precut holes to make stripping wire a snap.

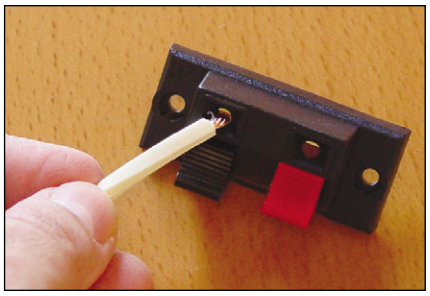
tighten the clamp, depending on the connectors you use.

When making connections, be sure to distinguish between the positive and negative leads. It generally doesn't matter which side is which, but you want to be sure to match the red terminals on the amplifier and speaker with one wire and the black terminals with the other. Otherwise, you end up with reversed polarity, which produces sound but gives you lousy imaging and a poor frequency response. A good rule of thumb: Use the wire with either printed typeface or a white line on it as the positive lead and the wire without any lettering as the negative lead.

Once you've cut, stripped, and terminated the wires properly, connect all of the speakers to the surround receiver or amplifier. Use plastic wire brackets to run wire along the wall and hold it in place. They come in several sizes, including models designed specifically for flat speaker wire and thicker-gauge round cabling. Space the brackets at about one per 4 feet of speaker wire. For thicker wire, you may need more brackets, as you don't want to see sagging wire between each bracket; conversely, for thinner wire, you don't want use too many brackets and give the appearance of stitched-up Frankenstein scars on the wall.



Twist the strands of wire tightly at the end for a cleaner connection.



Connecting bare wire to spring terminals, although common, does not give the cleanest connection.

Wired For Sound

The home theater is quickly becoming a cornerstone of the modern living room. Often the only thing preventing some people from taking the plunge is the idea of covering a living room in ugly wiring. By taking a little care in planning out the wiring of a new system, and allowing a little extra room in the budget for proper cabling and connectors, you'll end up with a great-looking room and a great-sounding home theater. CE

BY JAMIE LENDINO

Wire Quality

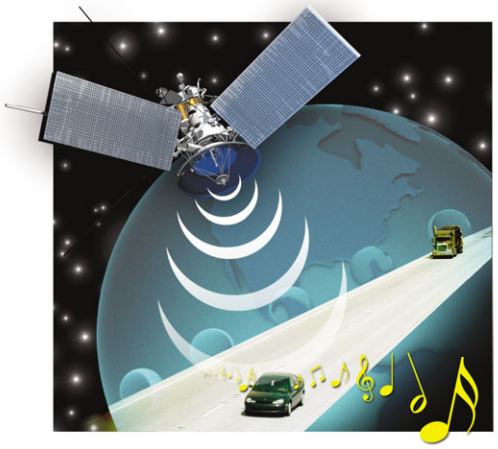
Wire quality has inspired raging debates among audio hobbyists for decades. A recent check of Internet audiophile message boards shows the debate isn't abating. There are many kinds of speaker wire, ranging from thin, loose wire that comes free with some speakers to thick, oxygen-free wire, made of exotic material that costs more than $100 per foot. At the center of the battle is whether you can hear the benefits of higher-quality, more expensive speaker wire (as well as component interconnects). If you believe you can, the cost is justified; if not, it's snake oil pushed by esoteric wire manufacturers who capitalize on what the "golden ear" crowd thinks it can hear.

There is some merit to the debate. On the one hand, most scientific tests to date have shown that there's virtually no difference among brands of speaker wire. In other words, buy the least expensive wire you can find of the appropriate gauge and length and stop there. On the other hand, some audiophiles argue that tools sophisticated enough to measure every nuance don't exist. Besides, certain kinds of distortion of a pure signal might actually be audibly more pleasant (such as with tube amplifiers). Therefore cables using exotic materials can lead to a better listening experience.

At *CE Tips*, we're going to take a middle-of-the-road approach and say that for inexpensive packaged speaker systems, basic 16-gauge wire available at RadioShack ($6.39 per 30-foot spool; www.radioshack.com) is sufficient. Consider upgrading the 18-gauge (or thinner) wire that comes with products, such as the Sony Dream System and Bose Lifestyle series, for improved sound quality. Wire is important, but so are your speakers and their placement, the other components in your system, and the room acoustics.

For higher-quality component-based systems, we recommend you consider 14-gauge or sturdier wire and speaker connectors from a reputable manufacturer in order to bring out as much musical detail as possible. Beyond that, the jury is still out. ■

Digital Radio Goes Local



Understanding HD Radio

As any satellite radio user can attest, digital radio puts the analog AM and FM formats to shame, and it changes the way people think about radio. Now the days of static, tinny audio, and sitting through a block of songs hoping the DJ will let you know who was singing them are about to end, all thanks to satellite radio's counterpart, terrestrial digital radio.

Where the two main satellite radio providers, Sirius (www.siriusradio.com) and XM Radio (www.xmradio.com), charge monthly subscription fees in addition to their upfront hardware costs, terrestrial digital radio broadcasts consist of the same free local AM and FM content you hear on your current radio. The difference between AM/FM and digital radio is that the digital format lets FM stations broadcast CD-quality audio and AM stations broadcast FM-quality audio. Digital radio offers a host of other potential features and services, as well.

HD Radio

The digital radio standard used in the United States is called HD Radio and was pioneered by iBiquity Digital (www.ibiquity.com). HD Radio is based on IBOC (In-Band On-Channel) technology that digital radio stations in Europe already use, and it works by weaving digital data into standard analog AM and FM broadcasts. This lets broadcasters transmit both the analog and digital broadcasts from a single transmitter so users of analog and digital radios receive the broadcasts.

To add digital content to their analog broadcasts, stations must install hardware that converts the analog audio feed to digital and compresses the digital information. Stations must also install transmission boxes that blend the analog and digital broadcasts. "The total cost for conversion depends on the equipment at the station," says Michelle Abraham, a senor analyst with In-Stat/MDR. "It could be $30,000 to $40,000 worth of new equipment, or it could be several hundred thousand dollars' worth of equipment."

That sounds expensive, but the conversion process is more of a long-term investment than a gimmick. Stations can continue to broadcast analog content so they don't alienate their listeners who have standard radios while still catering to listeners who bought HD Radio equipment, all without charging a subscription fee to differentiate between the two types of service. Of the largest radio broadcasters in the United States, 15 have invested in iBiquity, including Clear Channel Communications, and hundreds of stations nationwide are transmitting HD Radio broadcasts.

Digital radio users still tune stations the old-fashioned way, by dialing in the frequency of the analog station. "The broadcasters intentionally delay the

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$849.95

www.jvc.com

If you want a receiver for your car that has built-in support for HD Radio broadcasts and also plays CDs, JVC's KD-SHX900 is the ticket. It boasts a 256-color display, is rated for 200 watts of maximum power output, and handles commercial CDs, as well as CD-R/RWs with MP3 or WMA compressed digital music files.

analog from their source by about five seconds," says David Salemi, vice president of marketing at iBiquity. "In the receiver we intentionally delay the reception by about five seconds on the digital side to retime-align it." So, listeners hear the analog broadcast immediately, while in the background, the digital radio fills a five-second buffer with the digital portion of the broadcast. Once the buffer's full, the radio seamlessly transitions to the high-quality digital broadcast, which doesn't suffer from the static, hiss, or interference that plague analog broadcasts.

One of the main problems with digital broadcasts is that they are either on or off, and when they cut out, they do so abruptly (called the "cliff effect") as opposed to fading out gradually the way analog transmissions do. The five-second buffer lets HD Radio equipment skirt this problem by seamlessly transitioning back to the analog broadcast if the digital broadcast cuts out. Once the radio is back within the range of the digital broadcast, it can refill the buffer and transition back to digital mode. All of this happens automatically, and the only difference users perceive is the change in sound quality as the unit jumps from analog to digital or vice versa.

Two For One

Improved sound quality is arguably the most important advance HD Radio offers over analog radio, but the fact that broadcasts incorporate digital data opens up a slew of new possibilities. HD Radio broadcasts using FM offer 96Kbps (kilobits per second) of bandwidth, which can be allocated in nearly any way the broadcaster chooses. "We've designed the system to be very flexible so the broadcaster can take that 96 and pull it back in 8Kbps chunks," says Salemi.

This ability lets broadcasters allocate some of the bandwidth for text or other data, and all HD Radio receivers will incorporate at least a basic LCD that displays text information such as artist, album, and track names. Stations can show their call letters, talk shows can display a call-in number, and advertisers can use the feature to display product names or numbers listeners can dial to buy the advertised products.

The ability to split up bandwidth also opens up the possibility of broadcasting multiple streams of digital content on the same channel, a technology iBiquity calls Supplementary Audio Channels. "We've proven through the satellite radio broadcasting you can take that [96Kbps] down quite a bit—to almost 48Kbps—and still have FM quality," says Salemi. Broadcasters can broadcast two FM-quality music channels at 48Kbps, for example, or allocate more bandwidth to a music channel to achieve better sound quality while using a lower bit rate to transmit weather, traffic, or other talk-based broadcasts that don't necessarily benefit from high-quality sound.

NPR (National Public Radio) has already demonstrated the viability of Supplementary Audio Channels with its Tomorrow Radio HD radio project. Here, the broadcast is divided into a 64Kbps stream for music, which theoretically exceeds FM in terms of audio quality, and a 32Kbps stream for talk-based programming such as All Things Considered.

Supplementary Audio Channels are only possible with FM broadcasts. At 36Kbps, AM HD radio has only a fraction of the bandwidth that FM HD Radio has. AM bandwidth is enough to transmit both text and audio but not enough to support two audio streams with acceptable sound quality.

HD Radio vs. Satellite Radio

It would seem the satellite radio providers and HD Radio broadcasters are poised for a fight, but most experts agree that the two services are complementary instead of competitive because they serve such different purposes. "You're going to have some people who are on XM and Sirius who want to maybe split off and listen to the local morning DJ," says Salemi, "but in the afternoon they don't really have a favorite DJ, so they listen to [satellite] radio."

Free high-quality local content is HD Radio's biggest selling point over satellite

Kenwood KTC-HR100

$500
www.kenwoodusa.com

The KTC-HR100 from Kenwood is a tuner designed to connect to Kenwood's HD Radio-Readycar receivers, such as the Kenwood Excelon series. It receives and converts incoming HD Radio transmissions so the attached head unit can play the digital content and potentially display any text included in the transmission (provided the head unit has a screen that displays).

Panasonic CQ-CB9900U

$999.99
www.panasonic.com

Panasonic's 200 watt CQ-CB9900U plays standard CDs and CD-R/RWs with MP3 or WMA (Windows Media Audio) files, and it also incorporates an integrated HD (high-definition) Radio tuner.

radio. It still suffers, however, from the range limitations imposed by AM and FM technology instead of enjoying the coast-to-coast coverage provided by the subscription satellite services. Because terrestrial stations generate most of their revenue from advertising, adding text capabilities to the screens (and possibly video capabilities in future models) provides advertisers with another means of sending their messages to listeners.

Unfortunately, text messaging adds another potential source of annoyance for listeners who are already bombarded by audio ads, so will customers stand for it? "No backlash is expected, outside of any disillusionment radio listeners already experience due to the advertising already found on terrestrial broadcasts," says Susan Kevorkian, a senior analyst with IDC. "In fact, it may be perceived as desirable by consumers if stations replace some audio-based advertising with text-based advertising."

One of the main benefits satellite radio offers is an enormous selection of music, talk, and entertainment channels. Regardless of the type of music you enjoy, you're bound to find a satellite station that plays it 24 hours a day, commercial-free, which is rarely the case with AM and FM stations. Ironically, relatively ancient AM technology could become satellite radio's biggest competitor because the leap to FM sound quality that HD Radio provides makes the format viable for music again. "An AM station only costs about one-tenth what an FM [station] does," says Salemi. "We've seen already some very small FM stations spend the money to go to digital, and a lot of the reason is because they either want to go to music formats or they're in a music format and they want to just improve their service." AM stations may spring up that offer the types of niche music formats that satellite providers rely on to draw customers, letting AM compete with both FM and satellite radio in terms of music delivery.

Don't sweat it if you can't decide between satellite radio and HD Radio; you probably won't have to. "We expect that satellite radio and terrestrial digital radio technology will be combined in audio hardware along with other digital audio technologies," says Kevorkian. A few of these products are available now, and you can read more about them in the "Digital Radio Receivers" sidebar.

HD Radio Tomorrow

Although there are competing satellite radio services, there is absolutely no threat of a terrestrial digital radio "format war" in the future because the FCC selected HD Radio as the standard digital radio format in 2001. Early adopters can, therefore, buy HD Radios knowing that they won't be obsolete in a few years, but that doesn't mean everyone should rush out to buy one. Today's receivers handle only the basic services HD Radio currently offers, such as simple text scrolling, but there are big plans for the future. "Next-generation services are expected to include such information as news, sports scores, stock quotes, traffic conditions, and weather reports, as well as audio and ecommerce services," says Kevorkian. "Their deployment is not expected before 2006, pending the establishment of an installed base of digital radio hardware."

iBiquity demonstrated one potential feature at the 2004 NAB (National Association of Broadcasters) convention in Las Vegas by using digital traffic information from an HD Radio broadcast to update a car's GPS (global positioning system) in real-time. As hotspots appeared in traffic, the GPS displayed them on the screen as icons and automatically changed the recommended route to avoid the snarls. The ability to share digital information with other digital devices could prove to be HD Radio's most important feature in the long run, and it won't be long before listeners can buy items, tickets, or other goods based on a radio ad; upload the information to a home PC or network via a wireless Internet connection; and download data to their cars using the same wireless network. "If it's music and there's hard drive capability in your radio, that could be downloaded and dumped into your radio before you turn your ignition off," says Salemi.

HD Radio will support surround sound, and HD Radio functionality should show up in many different types of devices throughout the coming years. "At some point you're going to move beyond traditional radios," says Salemi. "There's no reason you can't have an HD Radio chip in a cell phone or an e-tablet or a PDA." Thanks to the text capabilities of HD Radio, this means breaking news headlines could pop up directly on your PDA without having to connect to a wireless Internet network. Of course, it also provides a means for advertising to find its way onto a PDA screen. Now that even radio has turned into a digital data pipe, anything is possible. CE

BY TRACY BAKER

Digital Radio Receivers

HD Radio receivers haven't been available commercially for very long. The first unit sold in January 2004, and there are currently only two receivers and one tuner on the market. That will change dramatically by the first quarter of 2005 when several companies are slated to launch home and car receivers. Companies that have licenses to manufacture HD Radio products include Alpine, Clarion, Delphi, Fujitsu Ten, Harman Kardon, JVC, Hyundai AutoNet, Kenwood, Mitsubishi, Onkyo, Oritron, Panasonic, Sanyo, Visteon, and Yamaha.

Only Kenwood, Panasonic, and JVC have committed to shipping HD Radio equipment in 2004, and for the time being, all HD Radio receivers for cars are aftermarket products. "The first radios are not likely to ship in vehicles as options for cars until the 2006 model year," says Abraham. "It's going to be a long time before HD Radio takes over in every clock radio in the country." ■

Out Of The Box

Add A Second Amp To Your Home Theater System

So you've taken the plunge into home theater with a big screen TV, a 5.1 multichannel receiver, and a DVD player with all the trimmings. Now that you've been enjoying the pleasures of the cinema in your home, there's just one problem. Your present receiver provides 5.1 channels, but the current standard has moved on to 7.1 channels (which means an additional two side channels). If your receiver is 7.1-ready, you can upgrade your system to that standard. Or, perhaps you're happy with your present home theater setup, but you want to pipe sound from your main system to another room of the house. Either way, you'll need to feed those additional speakers with additional channels of amplification from a second, or outboard, amplifier.

Know What You Want

Rejigging your current system to add extra channels may be doable, but before you board that train, you may want to consider your goals. Home theater is for watching movies and listening to music. Two things that enhance these activities are the quality of the sound and the surround-sound illusion. The first question you should ask yourself is whether your goal is to enhance your system's sound quality or to enhance the surround illusion. If you want to add sound to another room, of course, then neither applies and you can skip the next few paragraphs.

The quality of the sound itself is determined by the quality of your sources, your amplifiers, and your speakers, not to mention the wires used to connect components to each other and to the wall power supply. Special after-market power cords, for example, can significantly enhance fidelity in an audio system. Achieving true high fidelity, which has to do with faithfulness to the source recording, the realism of the musical result, and the emotional impact of the sound or music, is a long, expensive journey. For this reason, dyed-in-the-wool audiophiles concentrate on optimizing every aspect of a two-channel stereo rather than attempting to achieve the same results with more channels. So be warned, upgrading a 5.1 system to a 7.1 system without improving the quality of the components may improve the surround sound illusion but likely will not improve the sound quality.

If you want to enhance the surround sound experience, on the other hand, then by all means, add more channels. If your home theater system is installed in a large room and you find that there are holes in the surround sound—you hear the side speakers separately from the front, for example—then adding rear channels may be a valid option. Keep in mind that, at present, few sources contain actual 7.1 data. The rear channels are usually digitally interpolated from the sound contained in the other channels by an algorithm in the processor.

Finally, don't forget that there's more than one way to skin this cat. Instead of buying a satellite amplifier and adding it to your system, you might also consider trading your present receiver in for a newer model that has all 7.1 channels built-in. With the help of trade-up programs offered by many retailers, the cost may be similar to purchasing an additional amp (and the cables needed to connect that amp to the receiver). As an added bonus, this route may represent a way to both increase fidelity (by replacing the old amp with one of higher quality) and the number of available channels at the same time.

Optimize First

If you're vaguely dissatisfied with your present system but you can't quite put your finger on whether the problem is fidelity or the surround illusion, your first step should be to optimize what you have.

Speakers. The watchwords for speakers in a multichannel setting are quality and uniformity. High quality is hard to get in a three-way speaker (one that has a woofer, a midrange driver, and a tweeter) for less than $1,000 per pair. You can get excellent quality two-way

speakers, however, for much, much less. If you're planning to spend what most people spend on speakers (less than $1,500 for all of them), our advice is to stick with identical, inexpensive, yet high-quality two-ways all the way around.

The "identical" part is crucial here. Remember that the surround illusion is just that: an illusion. To create the illusion effectively, all the speakers must have an identical sonic signature. Put another way, a system achieves the illusion of a convincing sonic ambience if, and only if, all of the channels make the same set of errors. If you've heard any of those cheap "mini" surround systems that use tiny, poor fidelity cube speakers yet are able to produce a convincing surround sound illusion, you know what we mean.

Other Components. Despite received wisdom to the contrary, all DVD players are definitely not created equal, either in picture or in sound quality, and the type of connection you make between your receiver and your DVD player may have a significant impact on their sound. Please don't faint, but the ubiquitous plastic fiber-optic Toslink interface is notoriously poor for sound quality. If your DVD unit has a coaxial output, try it.

Don't make the common error of assuming that poor sound quality comes from insufficient power. This is, in fact, rarely the case. Insufficient power can be the cause of insufficient volume or loudness, but sound quality is primarily a function of the quality of the electronics and not the power output. Upgrading your system by adding outboard amplifiers merely for extra power is not usually the way to go because the quality of the preamplification and processing is generally more important than the amp's power.

Set Up For 7.1

So you've made it to this point, and you still want to add a second amplifier to your home theater. A number of 7.1-ready receivers are out there that offer decoding and line-level outputs for two extra channels but do not have built-in amplification for those channels. If you own one of these, you can either use the two extra channels to provide sound to another room in what is commonly called a zone-2 configuration, or you can add the extra channels to your main room for 7.1 surround sound. For advice on selecting an appropriate amplifier, see the "How To Select A Second Amplifier" sidebar.

Adding an outboard two-channel amp to a 7.1-ready receiver is a cinch. First, identify the two line-level outputs on the back of the home theater receiver that correspond to the sixth and seventh channels. These may be labeled Rear Surrounds, Auxiliary Surrounds, Zone-2 or something similar. If you are setting up your amp in the next room, plug a pair of interconnects (cables with RCA plugs on either end) into these output jacks. The other ends then go into the inputs on your outboard amplifier.

If you are adding channels to your home theater system in the same room, it is probably best to connect the second amp to the line-level outputs for the left and right main speakers and use the home theater receiver's internal amps to drive the extra surrounds. Your main speakers are the most important for music and are likely to be bigger than the other speakers, so they may benefit from the extra power that a typical auxiliary amp provides.

The Onkyo M-282 looks like a pretty simple device, but it can boost your 5.1 home theater system to 7.1-channel sound.

Use the M-282's trigger switch, shown in the left side of this picture, to automatically turn it on when you fire up your primary amp.

A Specific Example: The Onkyo M-282

Let's look at a typical outboard two-channel amplifier: the Onkyo M-282. This is a sturdy 120 watts-per-channel unit with very few controls. You plug the two RCA inputs in from the outputs on the other amp, connect the speakers, and plug in the unit. To avoid having to turn the Onkyo on and off manually, this unit has a 12V trigger input that lets your receiver turn it on or off. A wire is provided that will connect the Onkyo amplifier to the 12V trigger output on your receiver, assuming that the receiver is so equipped. Flip the trigger switch on the back of the M-282 to 12V Trigger. You should now be able to turn the whole system, including your outboard amplifier, on and off using only the main remote. If your receiver does not have a 12V trigger output, the Onkyo also has the option of automatically switching it-

self on when it detects an audio signal. Simply set the trigger switch on the back panel to Audio.

The good people at Onkyo have also provided a ground connection on the back panel. Connecting this to the ground post on the home theater receiver is a good idea because unequal ground levels between components can result in an annoying hum. (The other way to correct hum caused by ground loop problems is to plug all the components in to the same wall socket.)

Configuration

Having made all the right connections, your enhanced system probably won't immediately work. It's time to face the music and delve into the Byzantine corridors of your receiver's configuration menus. It's best to have your receiver's manual close at hand (but don't, for goodness sake, look at it unless you absolutely have to).

The menu options vary with each receiver, but generally you'll find a channel setup menu that will allow you to turn on either extra surround channels for 7.1 mode or a zone-2 mode to send sound to another amp in the next room. There will also be a processing mode menu that selects which 7.1 processing standard you prefer and how you want your CD two-channel sound to be distributed. The 12V on/off trigger, however, will likely work without changing any of the configuration settings. Give it a try.

If you have connected the second amp to the two main line-level outputs, you must reconfigure the home theater receiver to use its internal amplifiers for the surround channels and send only a line-level signal to the satellite amp. This is most likely to be found in a channel setup menu under a rubric such as Assign Channels or Active Channels. The goal here is to assign the center, side, and rear channels to active amplification from the home theater receiver, while the main channels go to a line-level output for amplification by your outboard amp.

Having activated your additional channels, you should be able to hear sound coming out of them when you play a DVD or a CD. Controlling sound in the next room is straightforward. Just select the source of music to be played in the second zone and adjust the volume. That's it. Some receivers conveniently offer an auxiliary remote to control the audio in the second room, but the hidden cost here is that you usually need an infra-red repeater station (not included) to send that remote's signal from the next room back to your receiver.

If you are adding channels to your surround sound system, then it's essential to balance the additional channels to work in harmony with your existing 5.1 setup. Most receivers provide a white noise output that can be used to adjust the relative volume of each channel and the amount of digital delay. If not, there is a selection of test DVDs available that provides sample outputs to help you with channel balancing. We highly recommend these because they often come with neat 3D sound balls that appear to move around the room when your system is properly set up. Test DVDs, such as the Avia: Guide To Home Theater from Ovation Software (www.ovationsw.com), can also be very helpful in adjusting the picture on your video display.

The relative volume levels should be adjusted so that the sound coming out of each channel appears to have the same volume when you are sitting in the center listening position. On the M-282, there is an Input Level adjustment on the rear panel that you can use to turn down the volume of the whole unit if the adjustments in the receiver's menu are not enough. This process sounds easy but actually requires rather careful listening. One way to take some of the guesswork out of the process is to buy an inexpensive dB (decibel) sound level meter (available at RadioShack and other electronics stores).

The next adjustment available on most receivers is digital delay. This allows for a small delay to be added to a channel to compensate for the actual distance of the speaker to the listening position. A few milliseconds of delay makes a channel sound as if it is farther away from listener. If all of your speakers are equidistant from the listening position, then no delay is required.

A Final Word

Multiamping is technically straightforward, but it requires some thought and a look at the big picture to achieve long-term satisfaction. Look before you leap, and then take the plunge and have fun with it. CE

BY ROSS MANTLE

How To Select A Second Amplifier

Two-channel amplifiers come in all shapes and sizes. If you're adding one for use as a sound source in a separate room, then the sky's the limit. Get the best amplifier you can afford because matching the sonic characteristics of the amp with your present system is not an issue. There are some excellent two-channel amplifiers on the used market, for example, that have been discarded in the rush to multichannel receivers. But the two-channel amps will blow the doors off most 5.1 receivers in terms of sound quality.

If your goal is to add extra channels to your present HT system by adding a second amp, however, you'll need to carefully match that amp to your current system. Ideally, the second amp you select should be of the same class, similar power rating, and same manufacturer as your present receiver. Otherwise, the extra channels you add will have a different sonic signature, which can destroy the surround sound illusion. And don't forget to use the same kind of wire to connect the amplifier to the other components. Every brand and type wire has its own signature. ■

A/V Tips

Make Your A/V Products Work At Their Best

Clamp Down On Speaker Wire

If you're disappointed in your speakers' performance, try changing your speaker connections. The least desirable setup is to stick exposed speaker wire into a clamp on the back of a receiver or loudspeaker. Copper wire corrodes over time, and the connection isn't very solid. If your speakers or receivers use spring-loaded terminals only (as opposed to a five-way binding post), attach high-quality gold pin connectors to the ends of your speaker wires, which is a more reliable connection. If you twist the wire around the binding post, switch to pin connectors and insert the pin into the binding post's slot; and then tighten the post onto the pin. Even better, use banana plug connectors and slip the banana plug into the binding post's hole. Banana plugs fit snugly inside these jacks, creating a more solid connection with greater surface area. They'll provide the best connection for your system's speakers.

Banana plug connectors improve sound quality and ensure a snug fit for your speaker wires in five-way binding posts.

Go Back To Bunny Ears

It may sound strange to champion rooftop antennas in this day and age, but your best (and most affordable) source of digital and high-definition television programming is old-fashioned OTA (over-the-air) broadcasting. In fact, many people get more digital channels over the air than through cable. Local stations in major metro areas now broadcast in HD, and you won't pay a penny for the signal. The Consumer Electronics Association's AntennaWeb site (www.antennaweb.org) provides a station list based on your ZIP code and even tells you where to point the antenna.

Calibrate Your TV

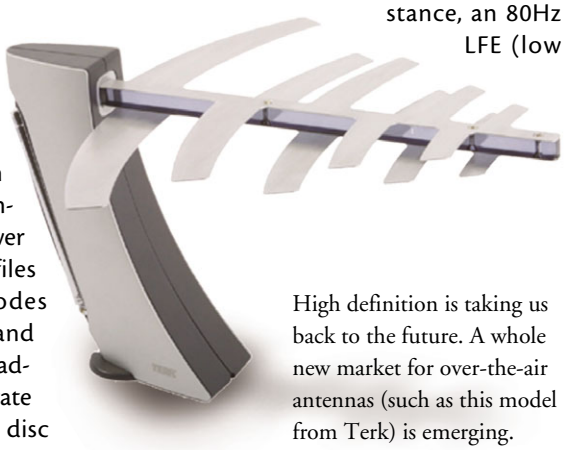
You don't have to spend thousands to improve your picture quality. Most retailers optimize TVs for showrooms rather than living rooms, so your TV can benefit from a few simple tweaks once you take it home. Check your manufacturer's documentation for details, but you can adjust the TV's color and contrast levels and, on many newer sets, color temperature profiles and predefined display modes (usually for movies, sports, and games). You can eyeball the adjustments or, better yet, calibrate the display with a reference disc (such as Digital Video Essentials [www.videoessentials.com] or Avia: Guide to Home Theater [www.ovationsw.com]). For high-end models or for situations where image quality is crucial, consider hiring a licensed professional to calibrate your set—he will have access to your TV's system menus that you won't.

Check ID

If you have a digital music player or an MP3-capable CD player, you'll be relying on the files' ID3 tags for track information. ID3 information provides **metadata** (data about data), such as artist, album, track number, and song title. Your playlists and on-screen displays will only be as good as the ID3 tags associated with your files. When you rip audio files, make sure to include the most relevant categories, including artist, album, and genre. For files you've obtained from other sources, check the tags for accuracy and consistency. It may be time consuming, depending on your library's size, but investing the effort to get your tags up-to-date will pay off in the long run.

Crossover To The Other Side

Help your loudspeakers and subwoofer sound better by controlling their crossover frequencies, either through the receiver or on the speakers themselves. **Crossover** refers to the process of separating an audio signal by frequency, sending each level to the most appropriate speaker. The crossover frequency is the point at which this split occurs. For instance, an 80Hz LFE (low frequency effects) crossover frequency would send all the sound below that level to a subwoofer (or filter out sounds above



High definition is taking us back to the future. A whole new market for over-the-air antennas (such as this model from Terk) is emerging.

that level from the subwoofer) while routing all higher frequencies to the woofers, tweeters, or midrange speakers. Setting crossovers appropriately (80Hz is the recommended cutoff for LFE) helps create a fuller, more powerful sound stage. Just make sure your crossover frequencies match so you don't leave any chunks of the spectrum out.

Control The Clutter

A tangled snarl of cables is more than just an unsightly mess. It can also create electrical interference and put your components at risk. Spend a little time labeling your cables and tying them out of the way and apart from each other. Invest in conduits or channels for wires that run along the wall or around the room. If you're really ambitious, take the time to run speaker and other long distance cables under the floor or through the walls. Your entertainment center will be tidier, your components will look and sound better, and you'll actually be able to sweep and vacuum around your entertainment center.

Use Your Connections

Whenever possible, use the best available connection for each component in your home theater. In audio, quality improves as you move from simple composite A/V cables (with red and white RCA jacks) to digital optical and coaxial cables. In the video world, the hierarchy works its way up from composite connections (yellow RCA jacks) to S-Video to component (separate red, green, and blue cables) connections. Newer formats, such as DVI (Digital Visual Interface) and FireWire, offer higher quality and more capacity for digital signals. You might have to buy a few new cables, but it's worth the difference.

Assume The Position

If your audio doesn't sound quite right, check the position of your speakers. In general, speakers should be placed at about ear-height (when sitting). Surround speakers benefit from a slightly higher placement directly to each side of your listening position. Center your listening position between the loudspeakers on either side of your entertainment center and place the speakers equidistant from the display screen. Subwoofer placement is less important, as low-frequency sounds are nondirectional, though placing the box in a corner provides a boomier sound (not always desirable) .

Universal remotes, such as this Harmony model, consolidate a series of commands into a single button.

Keep A Good Copy

Before you transfer your music files to a portable player, you have to rip and store them on your PC's hard drive. It's best to store files on your PC at a high bit rate (at least 156Kbps) to preserve more of the original recording's audio quality. That way, you can use them later in a variety of ways. For example, you can convert the high bit rate audio files to a lower bit rate (such as 128Kbps) so you can fit more files onto a portable player with limited storage. When you're ready to pipe the music through your stereo system, you'll be glad you used the extra hard drive space for the higher-quality encoding.

Program Your Remote

If you're sick of juggling half a dozen remote controls, save time and headaches by buying and configuring a programmable universal remote. Look for models with an array of supported devices and brands. Most useful, though, are options for learning your other remote controls' commands and recording macros. For the first option, program each of your remote's functions into the new one by setting the new and old remotes across from each other and programming each button. Follow the manufacturer's instructions for specifics on setting up this exchange. To create macros, record the steps and settings for common activities (such as "Watch a Movie") into the new remote to perform a complete series of actions with the touch of a single button.

Archive TV

If you're using your DVR (digital video recorder) simply to pause live TV and record a few shows, you aren't getting your money's worth. Do more with this exciting new technology by connecting the DVR's output jacks to a recording device (such as a VCR, DVD recorder, or an external hard drive). Save your favorite shows to the connected device, and then delete them from the DVR's hard drive as you archive them. This will stretch your DVR's storage capacity, plus your recordings will be portable. As with all transfers, use the highest-quality connections available for recording and record using an SP (Standard Play) setting to maximize quality.

Get In The Zone

Do you have a spare set of speakers and a room in need of music but don't want to shell out for extra system components? Most receivers have a Two Zone setting (A and B), so put them to use. Run speaker wire along the baseboard, under the floor, or even through the wall and attic to the room you want to set up the speakers in. Connect the receiver (use the Zone B output terminals) to the second speaker pair. Then use the receiver's controls to play your audio in either zone or both at once.

BY GREGORY ANDERSON

Sights & Sounds

If You Have To Ask, You Can't Afford It

Commentary by Brian Hodge

Owning the latest and greatest gadgetry has always inspired an unsubtle showiness in people, even ostentation. An entire subindustry has arisen just to serve rappers who commission cell phones, pagers, and other items that look as though they've been dipped in batter and rolled in diamonds.

And at last December's holiday parties, did I wallow in the ooohing and ahhhing of those who learned of the PowerMac G5 I'd just added to my arsenal? Like a pig. Yet will I feel somehow diminished when, inevitably, newer G5s come along to leave mine wheezing? Pathetically, yes.

With its ultra-chic, ultra-pricey Qualia line, Sony kicks these all-too-human predispositions into an entirely different stratosphere, in which electronics aren't merely a purchase, but a purchase experience. There's a difference.

Can You Smell What Qualia Is Cookin'?

As of this writing, the United States' inaugural Qualia boutique is still a few weeks from operational, but it should be open by the time you read this. Located in midtown Manhattan and accessible by appointment only, it follows on the heels of the very first boutiques that Sony opened last year in Osaka and Tokyo, Japan.

Fools and their money are soon parted, so the saying goes. The very wealthy can be a tougher nut to crack, but one of the surest routes is blatant ego massage. On that, Qualia delivers big. It doesn't do business online, only in person and on the phone. It provides customers ("guests," in Qualia-speak) with their very own shopping assistants, personal thank-you letters, comped tickets to concerts by Sony artists, and a quarterly newsletter. In Japan at least, boutique ambience includes a piped-in scent, specially formulated, presumably, for those who turn up their noses at Best Buy.

Unlike Coca-Cola's Dasani water, the Qualia line doesn't bear a name fabricated by marketing linguists. It's the plural of quale, which the Merriam-Webster Dictionary defines as "a property as it is experienced as distinct from any source it might have in a physical object."

Translation: You're not buying a gadget; you're buying a lifestyle and a state of mind.

Collect The Whole Set

So what actual tangibles can you buy? For a mere $3,900, you can take home the Qualia 016. In a numbering scheme that suggests trading cards, Qualia 016 is the official name of the cutest little digital camera you've ever seen. It looks like a microfilm camera from any of countless spy movies. Furthering the secret-agent motif is the aluminum and steel case, in whose molded compartments nestle extra lenses, a flash, a battery charger, plus other accessories, and of course the camera itself, which shoots pictures at a mighty resolution of (drum roll) 2MP (megapixels).

Yep—nearly 4 grand for bottom-tier resolution. Clearly, this is not a camera you'd buy for the pictures it takes, but rather the picture of you it sends to the world.

Other items in the line include Qualia 004 (home theater projector; $30,000), Qualia 007 (tabletop stereo system; $15,000), and Qualia 015 (cathode-ray tube TV; $12,000). Bargains at twice the price!

The camera that should've been labeled Qualia 007. To view Sony's other Qualia items, try its Japanese site: (www.sony.jp/products/Consumer/QUALIA/jp/index_flash.html). As of this writing, the American site (www.sony.com/QUALIA) is long on style, but short on substance.

It may sound as if I'm looking askance at Qualia, but it's only with one eye. I do chuckle at the irony that Sony, one of the world's largest mass producers of electronics, has figured out how to imbue some of them with a cachet of elitism. My other eye can't help but find the items drop-dead gorgeous.

Honestly, I hope Qualia catches on like wildfire. The profit margin should keep Sony's shareholders happy, and—just a wild guess here—the boutiques will provide gainful employment to a few sleek, haughty twentysomethings, for whom there can be only a finite number of gallery receptionist positions to go around.

It may even help shave a few bucks off stuff for the rest of us, who just want quality gear at good prices and are perfectly willing to leave the pampering to those who actually know and love us. CE

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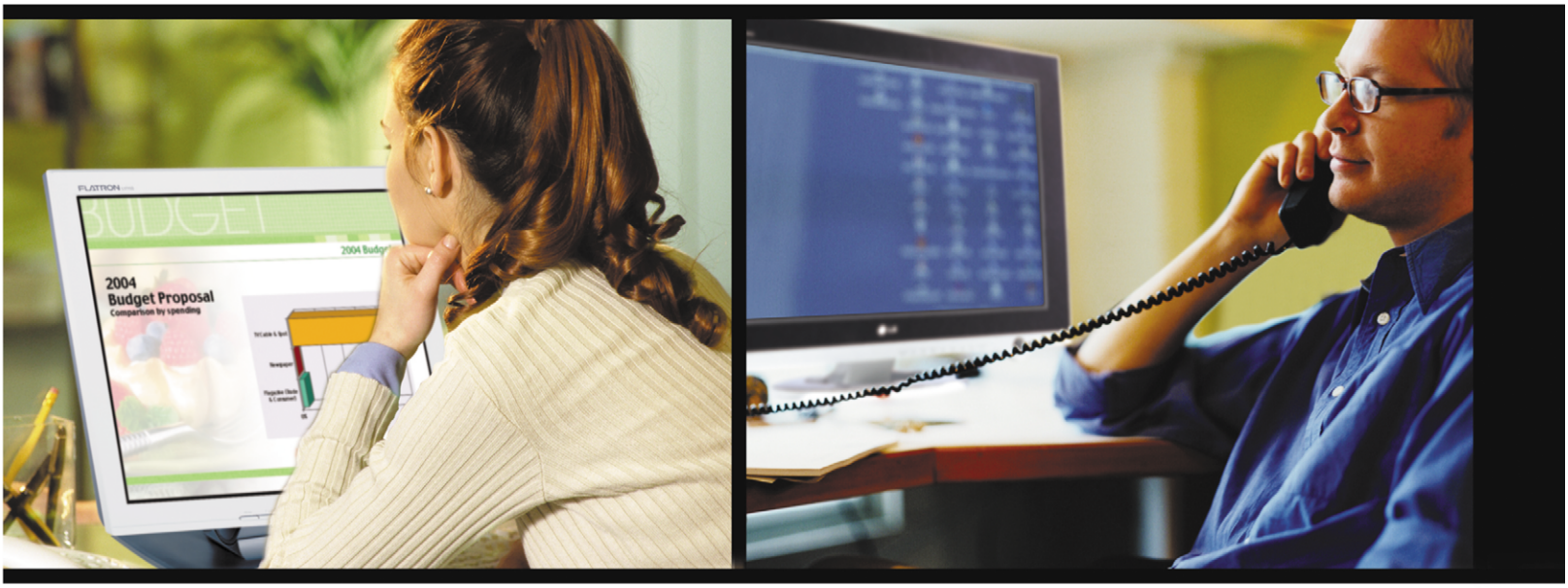

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Life's Good

Portrait Of A Home Theater Enthusiast

A Regular Guy With Some Cool Gear

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63 **Glossary**

Once upon a time, there lived a regular fellow with reasonable interests in reasonable things. We'll call him Bob.

One day, Bob bought a DVD player. He never admitted it to the guys at work, but even after a couple of weeks spinning flicks on disc, he still couldn't see what the fuss was about.

Yes, the picture seemed a little sharper (though not quite as breathtaking as he'd been led to believe). Some movies came with extra features, and all the video stores now stocked 10 DVDs for every tape, so Bob supposed it balanced out. All in all, he was glad he'd waited for prices on DVD players to come down.

Six months later, he set off to rent the latest Hollywood blockbuster and found the DVD selection cleared out. One lonely VHS edition remained.

That night, rolling tape again after watching DVDs for half a year, a veil lifted. Suddenly, Bob could see the heartbreaking superiority of digital video. But he still had no intention of getting wrapped up in all that surround sound craziness. The speakers on his 27-inch color television worked fine before; they certainly worked fine now.

The last time we saw Bob, he was upgrading his center channel and saving up for a 54-inch plasma screen.

Anatomy Of A Home Theater

What is the moral of this story? We're not sure, but by some studies, Bob is now 30% of the American public.

According to JupiterResearch analyst Avi Greengart, three in 10 consumers say they have a home theater. Greengart's findings also suggest that people's ideas about what actually constitutes a home theater may differ.

"When you ask [the same consumers] if they have digital surround sound," Greengart says, referring to the commonly accepted basic array of five speakers and a subwoofer, "22% say they do. So around 8% of online households think that they have a home theater without surround sound."

If you happen to be one of the 8% (or one of the other seven in 10), the articles in this section were written just for you.

The DTS-ES Matrix Revolutions

Some of us still remember waiting for the market to settle on VHS or Betamax before we shelled out for our first VCRs. We've now seen the rise of the laser disc, the appearance of Video CDs, and the eventual domination of DVD.

The Dolby Surround Pro Logic audio format arrived and begat Pro Logic II, which now quakes at the feet of Dolby Digital, the standard 5.1-channel digital audio format for DVDs, HDTV, and digital satellite broadcasts. Of course, Dolby Digital isn't the only 5.1-channel game in town. There's also DTS Digital Surround.

Just as consumers began to catch up to the 5.1 way of thinking, Dolby Digital EX, THX Surround EX, and DTS-ES Matrix/Discrete came along and added a rear center channel to the mix (for a grand total of 6.1 channels all the way around).

Oh yeah, 7.1-channel systems also are available, even though a true 7.1-channel audio format has yet to be developed.

Throw in the Plasma vs. LCD TV debate, and even the Bobs of the world may have trouble keeping up with what is and isn't a home theater these days.

All this, and we haven't yet begun to discuss how to set up your own home theater and get the most out of it.

The Tao Of Bob

We don't mind admitting it: Bob is us. And we say that with a few increasingly affordable pieces of gear, plus a little know-how, watching movies at home is more enjoyable than ever.

The articles in this section discuss everything you need to know in order to achieve your preferred level of Bobness. We'll examine the ins and outs of setting up a home theater, and we'll discuss how to troubleshoot problems you may encounter along the way.

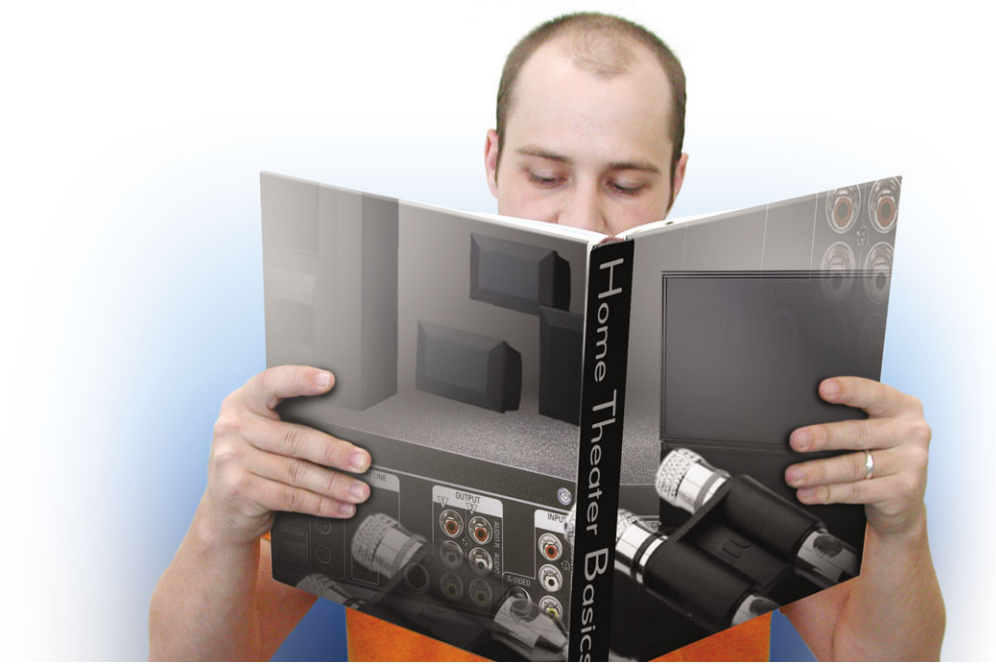
If you don't know DTS from a DLP from a DSP, don't worry. We cover it all in our glossary on page 63.

Let us begin. . . . CE

BY SEAN DOOLITTLE

Home Theater Basics

Solid Components For The Immersive Quality You Crave



Home theater means different things to different people. Ideally, your home theater will mimic a real movie theater—a large, entirely separate room with a huge screen and top-quality sound—with both the sound and the video immersing you in the movie-going experience as you sit with perfect comfort in your theater-quality seat. Indeed, one possible definition of home theater is a configuration of electronic devices designed to simulate, in your home, the experience of going to a cinema. Because most of us don't have that large, entirely separate room, home theater can mean a family room with the largest possible TV and the best available sound system.

As long as your setup satisfies your video and audio wants, you can't have a bad A/V system. Obviously, you need a minimum of equipment to have a home theater. Plugging a $10 pair of battery-operated speakers into the earphone jack of a 12-inch portable TV doesn't cut it; you need a TV (let's say 32-inch minimum, but preferably larger) with stereo A/V outputs and a set of powered computer speakers with a subwoofer. Add a DVD player or even a VCR, and you have a small home theater setup. Even so, most people don't call that a home theater. You need a more dedicated environment and more extensive and expensive equipment—not necessarily all the way up to a 72-inch rear-projection LCD TV and the best possible DVD running through a separate stereo system with multiple speaker types, but somewhere on the way to that goal.

Here's What You Need

Home theater setups consist of five component categories: video, audio, players, furniture, and cables.

Furniture? Yep, furniture. We'll get to that in a minute. Let's start with the two most essential elements of the setup: video and audio.

Video. Usually video means TV. You'll want the largest-screen TV you can afford. A 32-inch TV will satisfy few people who have home theater in mind. For CRT (cathode-ray tube) TVs, 36 inches is the absolute minimum, and 40-inch plus for rear-projection TVs are ideal. For some, until you reach a 51-inch screen, it just doesn't feel like going to the movies. Prices for these products have come down so dramatically over the last 18 months that if you want a 51-inch screen and you can afford it, get it.

A big-screen TV is a wee bit over the top if you plan to watch reruns of "The Brady Bunch," but it's just the ticket for that Matrix marathon you've been planning with your high-tech friends.

But largest isn't what's important. The video components must best fit your room; they must project the highest-quality picture; and they must awe you with clarity, depth, and richness of detail. The video system you place in a 15- x 10-foot room will differ substantially from the system you place in a 30- x 25-foot room or in a 11- x 8-foot room. If you plunk a 64-inch monster TV in a 12- x 10-foot room, you might re-create the experience of sitting in the first three rows at the cinema: too close to see the entire screen with too much emphasis on unimportant details. (See the "Tips For TVs" chart for tips on sizes for rooms and TVs.)

For a true theater experience, you need high quality. In TV technology, high quality means many things, but the number of scan lines provides the best immediate indication. To receive HDTV signals, you need a TV capable of 720p/1080i, which translates to 720 lines progressively scanned or 1080 interlaced. Products offering this quality will also provide 480p/480i for regular

TV, which may mean a clearer picture from standard TV signals.

Other TV features that strengthen the video quality are **comb filters** (they separate color information from contrast), with 3-line digital and 3D Y/C doing the best job; **digital convergence** and **digital focus** (precise alignment of red, green, and blue color beams); and a **video amplifier** (compensates for variance in signal strength). When considering a home TV, look for features that improve picture quality in these ways.

Video need not always mean TV. Some home theater users have turned to LCD projectors, those same projectors you see connected to notebook PCs at business presentations. These devices work extremely well for home theater video in many room sizes, with their variable positioning (and thus variable screen sizes) working to excellent effect. They tend to be fairly expensive, somewhere between a 50-inch rear-projection TV and a plasma or good LCD TV, and they add a rarely considered component to the mix: the screen itself (which you buy separately). You can't walk in front of them, and they usually require adjustable lighting to get the best viewing results. They can, however, give you excellent quality with much higher adaptability to room conditions, and you can also easily store them away.

Audio. Options abound for strong audio on your home theater system. For a small room, a $100 pair of stereo computer speakers with a subwoofer can give you all the power, all that growling and booming bass, and all the volume you'll need. You sacrifice balance among treble, midrange, and bass frequencies (computer speakers tend to sacrifice anything in favor of bass), but you'll notice an immediate, effective, and long-lasting difference between these speakers and your TV's built-in speakers. If your TV or DVD player is capable of surround sound (typically Dolby 5.1), buy a set of computer speakers designed for this technology, and you might need nothing else even for a larger room.

To get the best possible sound, however, you need a receiver and standalone speakers. Receivers range from less than $200 to somewhere near the stratosphere, and while much of the price has to do with output power, features come at a cost, as well. Look for Dolby Pro Logic (and Pro Logic II); Dolby Digital Surround Sound, 5.1- through 7.1-discrete input; THX capabilities; and even multiroom options (if you want to pump audio through the house). Most importantly, buy a receiver that will power your speakers well; if you don't, you might lose a large portion of the power of your sound. Check for ohm and wattage ratings for both. For your receiver and speakers to work perfectly, these ratings should match as closely as possible.

Get excellent sound with the Yamaha YHT-F1500 home-theater-in-box.

Speaker choices can overwhelm you. You can buy separate subwoofers and centers, lefts, and rights, even subdividing those channels by speaker type. To get started, buy either a surround package or pick and choose from individual speakers, making sure that these speakers will in fact function well together (ask your dealer or buy components designed precisely for that purpose). At a home theater store, listen until you get the sound you like (keeping in mind that they'll sound different at home). Spending $500 to $1,000 gets you a very good speaker package, but $100 or so will buy a pair of reasonably decent bookshelf speakers. For surround sound, however, you need more than stereo, so be prepared to spend a bit more. Look for the highest possible power rating (watts per channel), but be aware that manufacturers have differing ways of measuring this. RMS (root mean square) ratings give you the best

Tips For TVs

No hard rules exist to guide your choice of TV. Go with what works best in the room and for your eyes. That said, the following suggestions will give you some idea of what has become fairly standard for home theater recommendations:

Room Length	Screen Size	TV Type
10 feet	32-inch to 36-inch 25-inch to 30-inch	CRT LCD
12 feet	36-inch 30-inch plus	CRT LCD
15 feet	40-inch to 45-inch plus 30-inch plus 37-inch to 40-inch	Rear-projection LCD Plasma
20 feet	50-inch to 55-inch 50-inch plus 40-inch to 48-inch	Rear-projection Rear-projection LCD Plasma
25 feet	60-inch and above 60-inch and above 50-inch and above	Rear-projection Rear-projection LCD Plasma

benchmark; peak ratings much less so because of the lack of standardization for them. Just as important for speakers is frequency response and sustained volume at those frequencies. You want the widest response you can get, and you want the best continual volume at all frequencies.

For an inexpensive alternative, consider a home theater in a box. Available from numerous manufacturers, these packages usually contain a complete speaker system, a DVD player, and all the cabling you need. Most products include a 5.1 speaker system and a receiver with Dolby Digital 5.1 sound, so they really are a good way to start. At prices ranging from $300 to $700, they'll certainly cost you, but not as much as shopping for separate components.

Players. The best audio system in the world means nothing if you can't play sound through it, and the best TV in the world means little without content. You need devices to let you choose your media and your programming and to offer the highest quality of each.

Your TV's tuner already gives you one source for content, but you need more. First in line: a DVD player. For a good theater experience, you need a progressive-scan player, and, if you don't have a surround-sound speaker system, you may want a feature such as virtual surround sound, which provides a decent simulation of that experience. You also want component video outputs for the best possible video quality and support for Dolby Digital 5.1. Good DVD players range from $100 to $200 today and are packed with features. If you have the money, consider a DVD recorder, which provides recording capabilities similar to that of a VCR.

Today's DVD players provide a kind of Swiss army knife of media compatibility. Often, you can play not only DVDs, but also DVD-ROMs and DVD-RAMs, standard audio CDs, and music stored in CD, MP3, or WMA (Windows Media Audio) format on CD-R/RWs. You can even play video CDs (VCD format), but you don't usually want to because of the low-quality picture. Still, this is a good, flexible range.

You might want other players, however. A VCR, for instance, is easy to connect because you need only standard cables. Obviously, the higher quality the VCR, the better the picture, but in today's DVD age, VCRs tend to be used primarily for those old collections of tapes that you can't or don't want to upgrade to DVD. So, the actual quality probably doesn't factor in very strongly.

Games provide another typical use of home theater equipment, and a home theater changes the gaming experience considerably. You can connect a Nintendo GameCube, Sony PlayStation 2, and/or Microsoft Xbox to your home theater, using anything from standard A/V cables to S-Video and component video. If you have more than one console, you'll need to determine which one gets the best video connection, unless you don't mind swapping cables in and out or unless you don't mind buying a separate switchbox (a good idea anyway) that lets you keep all your components wired.

Watch the Grand Wega 60 rear-projection LCD TV with stunning clarity.

A good home theater functions well as an audio-only system. To your receiver you can connect a top-quality CD player, a portable MP3/WMA player, and even a turntable. Remember, your cable or satellite service offers digital music channels, and these give you CD-quality sound with reasonably palatable programming.

Furniture. One of the draws of today's huge movie theaters is comfortable seating. If you've ever been to a rundown theater, the furniture can often provide a negative experience, to the point of distracting from the film itself. When you're assembling a home theater, provide an immersive movie-watching experience and skip the bad furniture.

Are there rules for buying furniture for your home theater? Some, yes. Consider the rest of the room, unless you have a room devoted exclusively to your home theater. For the most part, however, you want to avoid:

Heavy, bulky furniture. This furniture absorbs sound, often muffling it, and especially affects both the higher and lower frequencies (upper trebles and lower basses). Often you get either a dull bass or a boomy midrange bass, overwhelming the rest. You can also lose upper-end sounds coming from the movie, such as birds chirping, wind chimes moving, crystal breaking, and upper-frequency musical instruments.

Hard, nonabsorbent wood or plastic furniture. First of all, watching the three extended Lord of the Rings DVDs back to back while seated in an upright wooden Victorian chair simply isn't a nice experience. But even more comfortable wooden and plastic furniture can result in sounds that are too harsh or too bright, precisely the opposite of the problems encountered with bulky furniture. Such sound can become abrasive and, if turned too loud, even damage your hearing, especially when you listen to screeching; whistling; hammering; and similar sharp, demanding sounds.

Space-hogging furniture that physically overwhelms the room. Your speakers need room to project, and your audience needs enough distance from your video equipment to acquire the perspective that filmmakers strive to create. Sitting too close to a 64-inch rear-projector TV renders even the best DVD difficult to watch, and if your furniture stretches across the front of your equipment, you'll practically guarantee that some of your audience will fail to hear not only the surround sound coming from the speakers, but even simple stereo sound. If you have a small room, use chairs rather than couches, and don't clutter the room unnecessarily.

Cables. You need cables and connectors or even the best equipment in the

world won't do anything for you. In fact, many products in the home theater lines include cables and connectors, with (generally speaking) only the more expensive failing to do so. That might sound strange—if it costs so much, shouldn't it include cables—until you realize that home theater aficionados tend to stress about cabling almost as much as they obsess about the equipment itself.

Cables matter. Larger speaker wire over a distance of more than 20 to 25 feet can significantly help the amplified signal reach the speakers; even over shorter distances, a larger cable can help drive low-ohm speakers. HDTV signals need shorter cables (10 feet or so) than standard TV (NTSC; National Television Standards Committee) signals, which can use standard S-Video cables of 100 feet or more.

You'll notice the sharpest price difference for your home theater in stereo audio cables and component video cables. In each case, you can pay between $50 and $150, although you can certainly find them for less. A simple rule is to spend from 5% to 10% of your home theater budget on cables, although the percentage decreases the more expensive your audio and video components. There's a limit, after all.

Still, don't ignore cabling and do yourself a favor by getting new ones. Many of us have drawers, boxes, and even suitcases full of wires from past electronic lives, but because you plan to make your home theater the focus of a great deal of your entertainment life, don't cheat yourself at the basic level of patch cable. Buy new ones designed for your purposes so that you can be sure they'll do the job properly.

When Are You Finished?

Your home theater is complete the minute you have an acceptable selection of items in each of the five categories. Of course, the key word here is *acceptable*. If you find yourself returning to the movie theaters not only because you want a night out, but because your home theater setup can't even approximate the experience you get in a cinema, then you don't really have an acceptable package. You have to be able to turn on your components, start the DVD, sit back in your chair with a bag of popcorn, and be dazzled by the clarity and size of the picture and the depth and fullness of the sound.

When it immerses you, you know you've finished. CE

BY NEIL RANDALL

Three Home Theater Setups

Low-Range (sub-$999)

Low-range doesn't have to mean low-powered. In fact, this setup will provide a thoroughly immersive experience in any smaller room at a decent cost. For a TV, consider a 32-inch tube, such as the Sharp 32F641, a flat-tube stereo set with numerous features ($499), or Toshiba's 32-inch 32A43 flat-tube set at $399. For your audio needs, as well as a DVD player, this is a perfect time to get into a well-priced home theater in a box, such as the Zenith DVT216 ($249.99; www.zenith.com), which includes an AM/FM tuner, as well as its DVD player, a solid 50-watt rms amplifier, and plenty of outputs. If you want to spend even less, RCA (www.rca.com) and Amphion (www.amw.co.uk) offer packages for as little as $99. On the slightly higher end, Samsung's HT-D2610 ($299; www.samsung.com) gives you a 5-DVD player.

Midrange ($999.99 to $2,999.99)

For a TV, you have to decide if you want HDTV and if you want flat-screen or rear-projection. We'll choose Sony's 51-inch HDTV-ready rear-projection KP-51WS510 ($1,699; www.sonystyle.com) for HDTV and rear-projection and the Samsung 22-inch LT-P227W ($1,799) for a smaller but crystal-clear LCD screen. For less money, a good 36-inch tube TV, such as Sony's 36-inch Wega KV-36FS210 ($1,099), will also suit you well. The audio choices at midrange are overwhelming, with individual components available, as well as predesigned configurations. We'll go with another home theater package because of the need to make all the pieces coexist happily. In this case, it's Yamaha's YHT-F1500 ($999.99; www.yamaha.com), with a 6.1 surround system and numerous surround settings, and six three-way speakers, all powered by a 100-watt amplifier/ receiver.

Upper-Range (more than $3,000)

Assuming the stratosphere is the limit, go for a rear-projector LCD TV, such as the Sony 60-inch XBR Grand Wega ($5,499), or one of several plasma TVs in the same general price range. If taking out a mortgage on your home theater isn't your idea of fun, scale it back to a 50+-inch standard rear-projection TV such as Mitsubishi's 65-inch WS-65313 ($2,399; www.mitsubishi-tv.com), HDTV-ready and obviously huge. As for sound, in this case, quite seriously, the best thing to do here is hire a sound engineer to help you configure the room precisely the way you want. The engineer will ensure that you aren't simply canceling out your sound waves and interfering needlessly with the rest. But if you want to do it yourself, once again go for a boxed set, although you can keep the amplifier/ receiver separate in this case. Bose offers an excellent choice with its AM15-II system (www.bose.com) at $1,299, with Athena clocking in at $1,199 respectively for its equally powerful Audition Series 5.1 and JBL at $1,299 (www.jbl.com) for its E Series Ensemble. All three systems will give you full, rich sound at all times. ■

Maximize Your Multiplex

Tips For Setting Up Your Home Theater

Whether you're setting up your home theater for the first time or looking for ways to improve your existing home theater's performance, applying the secrets used by the pros can help make your home theater perform at its best. Proper configuration and setup can help you extract the best audio and video performance from your home theater components, whether they're entry level or audiophile grade. Remember, even the best equipment can sound second-rate when it's set up improperly. To help you turn your bungalow into the Bijou, we've assembled a series of tips for each of your home theater components.

Displays

For the home theater, there's no more important component than the display, whether it's a traditional television, a projection TV, or a flat-panel display. Tweaking the setup of your display will give you the most return on your time investment.

Read your manual. Gone are the days of simple televisions with limited configurability. Today's displays are complex, highly engineered products with complex setup routines. Although most displays have acceptable picture quality out of the box, the better you understand your set, the easier it will be to calibrate. Resist the urge to begin connecting components. You'll actually save time by planning your setup instead of diving in headfirst. Different equipment vendors use different terminology for their features, so read the manual to understand what the manufacturer is telling you.

Calibrate your display. When your display was shipped to your local electronics emporium, it was precalibrated at the factory. This one-size-fits-all group of settings is inadequate for most home theaters. Depending on your display, calibrating may be a quick task or an hours-long process. Without display calibration, all the other tweaks we recommend are simply wasted effort.

You can't accurately calibrate using your eyes only. You'll need to use a calibration DVD to provide the proper test signals to adjust your display's output. The two leading contenders are Digital Video Essentials ($24.99; www.videoessentials.com) and Avia: Guide To Home Theater ($49.99; www.ovationsw.com). If you don't want to buy a reference DVD, many DVDs include the THX Optimizer that has a rudimentary calibration process. Although these calibration routines can be tedious, they'll result in a display that accurately reproduces your DVDs and HD content.

Disable SVM. SVM (scan velocity modulation) is used on CRT (cathode-ray tube) displays to attempt to increase the detail in transitions between light and dark areas of the screen. Often, SVM circuitry fails and actually increases distortion on your display. Turning off

A reference DVD, such as the Avia: Guide To Home Theater, makes it easier to calibrate your home theater.

SVM will usually improve your display's picture quality. Depending on your display, you may have to access the service menu to disable SVM, but keep in mind that accessing the service menu may void your warranty, so check with the manufacturer first. Other than cost, it won't hurt to hire a qualified technician to disable SVM. Many vendors also use different terms for SVM, often calling it edge enhancement or similar terms.

Use your best inputs. Depending on your DVD player or set-top box (cable or satellite), you'll need to decide which inputs to use on your display. Starting from best to worst, here are our recommendations: HDMI (High Definition Multimedia Interface), DVI (Digital Visual Interface), component, S-Video, and, finally, composite inputs. If you're planning on viewing HD content, you won't be able to do so over S-Video and composite inputs. Although not many sets currently ship with HDMI inputs, these single cable connectors will eventually replace component inputs for HD content.

Disable internal speakers. Most TV displays include at least two speakers for reproducing stereo sound. Unfortunately, the power and fidelity in these speakers is usually inadequate for reproducing the lush soundtracks of today's movies. Unless you're working on a tight budget and can't afford separate speakers for your left and right channels, be sure to disable these internal speakers. Otherwise, they will muddy the audio performance of your entire home theater.

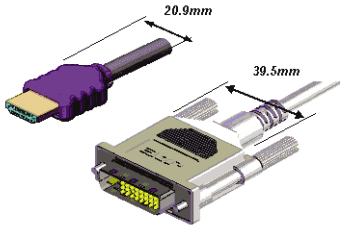
Properly position your display. Positioning your display in the appropriate location is a simple yet important step in improving your home theater's performance. Even the best displays can't compensate for bright sunlight and glare, so be sure to position the display where you can cover windows to reduce the amount of ambient light. Also, be sure your display is positioned properly in relation to your furniture. Depending on the type of display, you may find that the viewing angle of your display limits your seating arrangements. Rear-projection televisions are particularly notorious for having restrictive viewing angles.

DVD Player

DVD players are a major factor in the burgeoning popularity of home theaters, and despite the advent of HDTV, DVDs still provides most viewing material for home theaters. Today's DVD players are easy to set up, but the proper setup can make the difference between a good and an outstanding experience.

Enable progressive scan. Most DVD players support progressive-scan output, and compared to interlaced display, progressive scan creates a better image. Unless you have an external video scalar that converts interlaced output to progressive scan, you'll want to enable this feature. You typically enable this setting either through your DVD player's on-screen menu or by flipping a small switch on the player's back panel.

Use your best output. DVD players have two outputs: video and audio. To maximize your picture quality, you will want to use either HDMI or DVI output. If your DVD player doesn't have these newer outputs, your next best option is component. If component outputs aren't available, or your display doesn't have component inputs, you'll be restricted to either S-Video or composite video connections. Neither of these connections support progressive-scan outputs. For audio connections, the best sound will come from digital outputs. Most DVD players support either optical digital output or coaxial digital output. There's no significant difference in quality between the two connectors, so use whatever connector your A/V receiver supports. A good rule with both audio and video signals is to keep the signal in its digital form for as long as possible. This will minimize signal degradation.



The HDMI inputs combine HD video and multichannel audio into one slim cable.

A/V Receiver

Your A/V receiver takes the audio signal your DVD player or set-top box produces and decodes it into a multichannel format. A/V receivers are also often used as video switchers to compensate for a lack of multiple inputs on a TV.

Adjust your sound levels. When your receiver's in 5.1 or 6.1 multichannel mode, the output sound to each speaker is distributed at the same level to each speaker. Many A/V receivers let you to adjust the sound levels to ensure that each element of the soundtrack is properly reproduced. Improper sound levels will result in portions of the audio being overpowered by other sounds.

Adjusting your sound levels is easy if you have a sound level meter. You should be able to buy one, such as Radio Shack's Digital-Display Sound-Level Meter ($49.99; www.radioshack.com), for less than $50. Use the tone generation facility on your receiver and measure the sound output from each

speaker. Adjust the speaker outputs to the same levels, and you'll notice the subtle sounds that were previously masked by other speakers.

Use banana plugs for speaker connections. Most receivers use binding posts for connecting speakers. The threaded post and nut tighten on the speaker wire. You'll find other models with a spring-loaded post, which requires you to strip the sheathing from the speaker wire and insert the exposed wire into the post. However, you'll experience better sound, as well as less frustration, by using banana posts for making your connections.

Banana plugs are long metal plugs that you can connect to speaker wire with a nut or by soldering the exposed speaker wire. You can insert the banana plug into the center of a binding post and remove it easily when you need to. Many speakers also support banana plugs, and making these types of connections is easier than trying to coax a bundle of small wires through a small hole. When used properly, banana plugs reduce the amount of exposed copper wire, which limits oxidation. Oxidation builds up on exposed copper wire and reduces the signal quality. You should be able to find banana plugs at any store that carries electronic components, at approximately $1 per plug.

Configure your receiver's speaker settings to large. Most receivers let you set your speaker "size" as small or large. If you have four-way speakers for your main (left and right) speakers, you may be able to use the large setting. If you use large without a subwoofer, you may still get rich sound through your main speakers, but most subwoofers do a better job of reproducing bass than main speakers. If you don't have a subwoofer, don't use the small setting because the lows get routed to the subwoofer channel, and the resulting sound will be thin.

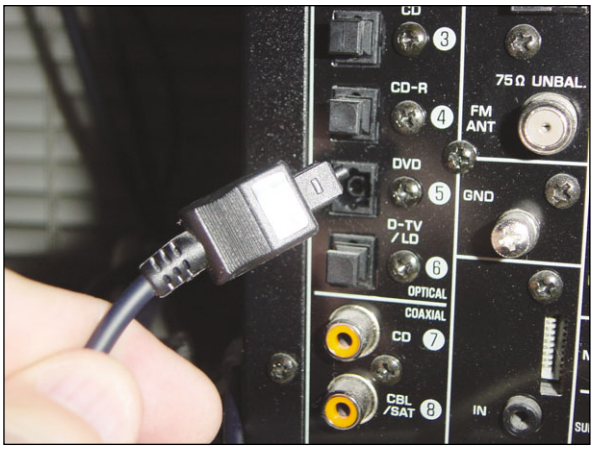
Images on large-screen televisions are hampered by glare so make sure you can control ambient light.

Speakers

Your home theater's speakers have a difficult task in recreating a theater-quality experience. Whether you have a collection of audiophile speakers or a more modest array of components, our tips will help you make the most of your system.

Use the proper kind of cable. There are two camps when it comes to speaker wire. One believes that spending hundreds of dollars on exotic speaker wire can significantly improve the sound of your home theater setup. The second camp believes that this is merely marketing hooey, designed to quickly relieve you of as much of your money as possible. Our recommendation is much simpler. When in doubt, use the correct gauge. Copper wire is measured based on the gauge or diameter of its copper core. The more electricity it is required to carry, the thicker the gauge that is needed. Also, a higher gauge cable will carry a signal farther, with less degradation. Wire gauge is labeled with a numbering scheme that increases as the wire diameter decreases. For example, 8-gauge wire is thicker than 14-gauge wire.

Use the right polarity. Most speakers use two wires to connect to your A/V receiver. One wire connects the negative terminal of your speaker to the negative terminal of your receiver, and the other connects the positive terminal. Depending on your speaker cable, it's com-mon to use the red cable for the positive terminal and the black for negative. The important thing is that you don't confuse which cable is used for which terminal. The result of incorrectly connecting your speaker wire is a speaker that is "out of phase." When your speakers are **out of phase**, they'll still function, but they'll sound a bit muddied and won't properly reproduce low frequency sounds.



Digital audio signals carried over TosLink fiber-optic cables avoids damaging distortion from electrical interference.

Hide your cables. Nothing hurts your home theater's audio performance like a cable that's ripped out of a speaker because you tripped on it. Unless you can run your speaker wires through

your walls, you'll want to devise a plan for safely securing them. If your home theater room is carpeted, you can run the cables along the room's baseboards. Speaker cable manufacturers also make a thin, flat cable that you can attach to your walls and conceal with a coat of paint. Finally, you can use a system, such as WireTracks (www.wiretracks.com), that conceals cables in a raceway along baseboards. You can expect to pay approximately $3 per foot of raceway depending on the exact configuration you choose.

A sound level meter is indispensable for properly adjusting your A/V receiver.

Position your speakers properly. The best speakers in the world won't do much to improve your home theater's audio if they're incorrectly positioned. Center channel speakers reproduce the majority of a movie's soundtrack and dialogue and should be positioned either above or below your display. Your main (left and right) speakers should be positioned at a slight inward angle, focusing their output on your main seating position. The surround speakers are responsible for adding an element of depth to the audio and you should position them a few inches behind and above your head. Finally, positioning your subwoofer depends on the acoustics of your room. The closer you position the subwoofer to a corner, the more bass it will output.

With a subwoofer, less is more. It's easy to get carried away with overpowering LFEs (low frequency effects) to the detriment of the overall sound quality. Use your subwoofer to emphasize, not overpower a scene. You'll experience a more authentic movie experience, and you won't have to worry about complaints from your neighbors.

Connect your subwoofer properly. Subwoofers come in two varieties: active and passive. Active subwoofers have their own built-in amplifier, whereas passive subwoofers require the receiver to boost the signal to a usable level. If you have an active subwoofer, the proper way to connect it is with an RCA cable from your receiver's subwoofer output to the subwoofer's mono input. If your subwoofer is passive, you'll need to connect it with pass-through cables from your front-left and front-right speakers.

Gold is good. When shopping for cable connectors, try to select gold-plated connectors whenever possible. Gold naturally resists corrosion, and corrosion prevents electrical signals from being transmitted properly. The price increase is usually quite small, but the payoff in long-term sound quality is high.

Set-Top Boxes

Whether you're a satellite subscriber or a cable viewer, you rely upon a set-top box to decode your video into a useable form. Set-top boxes vary widely by region and often by service tier. Getting the most from your set-top box gives you a solid foundation for quality in your home theater.

Banana plugs (pictured above) make your speaker connections sure and easy.

Use the best output. As with all A/V devices, using the proper outputs on your set-top box can make a world of difference in audio and video quality. Today's set-top boxes come with an array of connection methods, allowing you to use them with both new and antique TVs. Skip the urge to use the lowest common denominator and instead connect the set-top box with the highest-quality output. Although this will depend on the inputs available on both your TV and A/V receiver, the highest-quality signals are transmitted through your set-top box's digital outputs: FireWire, DVI, HDMI, and digital audio (both optical and coaxial).

Befriend your local installer. Have you ever tried to thread a coaxial cable onto a recalcitrant input while you're contorted between your TV and the wall? If you had taken a moment to chat up your installer, you could have avoided a twisted back and frayed nerves. Your cable or satellite installer is a wealth of knowledge that you can often access with copious use of the Golden Rule. To avoid the scenario we described, see if you can get a quality coaxial cable. These usually have smooth connectors that are easy to use in tight quarters. A kind word with your installer will often result in service above and beyond the call of duty.

Remote Controls

We don't have any tips for helping you find lost remotes, and the complaint we hear most often is how frequently and easily they disappear. However, we have a couple of nifty tips to help you program your remote for often-used features.

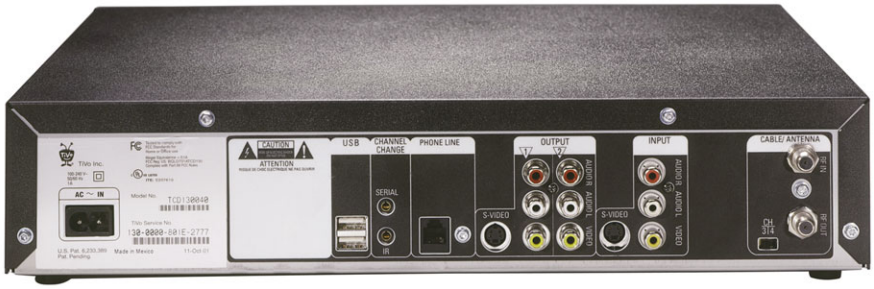
Use macros. If your remote control supports the use of macro sequences, take advantage of their flexibility. Macros let you use a single button to initiate action on multiple devices. For example, you could program a macro to turn on your DVD player, switch the TV to the DVD player's component inputs, switch your receiver to the DVD player's digital audio inputs, and dim the lights in your home theater. Macros take time to configure, but they're far easier than swapping modes on your universal remote.

Use discreet codes. When configuring macros on your universal remote, see if the remote supports discrete codes. Discrete codes let you configure a macro so that it won't change a setting if it is already set. For example, you may wish to turn on your TV as part of a macro sequence. If the set was already turned on,

a remote that didn't support discrete codes would attempt to turn the set on, resulting in the opposite action.

General Tips

Creating an enjoyable home theater is often more art than science. As you gain experience and expertise, you'll find that even the smallest tweaks can make your home theater experience more enjoyable.



Most set-top boxes have multiple outputs, and you'll want to carefully choose a connection. Go with the highest quality that your set-top box supports.

Use power conditioning. Ever notice that when your refrigerator kicks on, your TV's picture quality drops dramatically? Or when your house's A/C starts up, your audio becomes distorted? This is due to surges, spikes, and brownouts caused by inadequately shielded power connections. Although no surge protector or arrestor can protect your equipment from lightning strikes, you can prevent line irregularities from ruining your cinematic experience. At minimum, be sure you're using a surge protector capable of handling your A/V components. You can usually tally up the voltage requirements from your equipment manuals. Next, invest in a line conditioner that will even the ups and downs of your house's voltage. This can dramatically improve your TV's picture quality.

Minimize the use of splitters. Splitters let you increase the number of TVs or set-top boxes that you can connect to a single video source. Although this can be useful in conjunction when used with a TiVo or VCR, there are drawbacks. You typically connect your signal source to the splitter, then multiple cables to the splitter's output. The problem with using a splitter is that the signal strength may decrease, depending on the quality of the splitter and the number of outputs.

Manage your acoustical environment. Sound waves are directed energy that travel in a straight line until they encounter a surface that reflects the energy. Home theaters create the illusion of immersion by controlling when a sound reaches the listener's ear. If your home theater has too many hard, reflective surfaces, such as mirrors or wide expanses of glass windows, this illusion will be difficult to achieve. There are several ways to minimize the reflective surfaces in your home theater. You can use fabric drapes and carpet and rugs to absorb stray sound waves. If you want to exercise precise control, you can buy sound-absorbing panels from specialty vendors in the home theater market.

Don't just use your universal remote to replace your collection of remotes; save yourself some time and button-pressing by using custom macros.

Control your ambient light. Although today's TV displays are among the brightest ever marketed, no set performs at its best in bright light. If you're using a front-projection display, excessive ambient light can wash out images and reduce the amount of detail. If you have windows in your home theater room, minimize the amount of ambient light. Use thick fabric drapes, shutters, or tinted windows to control the light. You'll also want to eliminate or restrict any light sources in the room, as well. Lamps and lights cause glare and reflections on your screen, so be sure that you can easily turn them off at movie time.

Use surge protection for all inputs. Surge protectors aren't just for power inputs. A surge can travel into your entertainment system using any metal-based input. This means you need to shield against surges through your phone lines, TiVo units, cable, and satellite connections, and any other external wires that could carry a damaging current into your expensive equipment. Look for a surge protector that provides auxiliary protection such as the HTS 1000 ($229.95; www.monstercable.com).

The Devil's In The Details

Home theaters are more than just the sum of their parts: They're also a measure of the care and craft exercised in their design and setup. With the tips we've outlined, you'll be able to maximize your home-theater experience with a minimal expenditure of time and money. CE

BY CHRIS JACKSON

Lighten Up.

It wasn't so long ago that if you wanted to bring your data with you, your hardware had to come too. Well, that's all in the past now thanks to the new SanDisk Cruzer™ Mini. At under half an ounce, the Cruzer Mini goes anywhere, and with up to 256MB of flash memory, it takes a lot with it. Hi-speed USB 2.0 compliant, SanDisk's Cruzer Mini lets you transfer data faster than ever before. And at less than 8mm thick, all it needs is a single USB slot. Just drag, drop, and go. It's all about convenience – no extra hardware, no worries.

So whether you're installing utilities or updating print drivers for the umpteenth time, you can take your files with you wherever you go – and you won't even need your dolly.

For more information on SanDisk Cruzer Mini, visit www.sandisk.com/smart

HI-SPEED CERTIFIED USB
HI-SPEED USB 2.0

SanDisk

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Power Play

Practical, Effective Home Theater Usage Tips

A home theater is only as good as its settings. The most expensive televisions, DVD players, receivers, and other components all look and sound terrible if they are not adjusted properly, and those upgrading to modern technology may not be familiar with all of the new features and conveniences that have become standard equipment on today's models. Improving the quality of your home theater is easy if you know what to adjust when wading through menus and manuals.

Before following the tips in this article, arm yourself with a pad of paper, a pen, and at least one calibration disc. The pen and paper are for writing down all of the factory-default settings before making any changes, and failing to do this is a recipe for disaster. Calibration discs are indispensable for making audio and video adjustments and output test patterns or audio that lets users objectively fine-tune their system. We recommend Ovation Software's Avia: Guide To Home Theater ($49.99; www.ovationsw.com), or the less expensive and slightly harder-to-use (but no less capable) Digital Video Essentials ($24.99; www.videoessentials.com).

Television Tips

Nearly all television manufacturers adjust their sets at the factory to display the most in-your-face video on the showroom floor. Brightness and contrast are maximized, colors (especially red) are purposely oversaturated, and sharpness is cranked up to add perceived detail. This "torch mode" looks awful, reduces the useful life of the television by overworking components, and can even damage the set in some cases by burning images permanently into the screen. Don't let your TV suffer from these same problems.

Before following the tips in this article, arm yourself with a pad of paper, a pen, and at least one calibration disc.

Warm it up. Before making any adjustments to a new television, use it for several hours each day for two to three weeks to break in the parts. This is especially important with an analog CRT TV. When you are ready to make adjustments, let the television warm up for at least an hour before changing any settings. Televisions tend to become dimmer and duller over the years as phosphors, bulbs, and other components age, so recalibrate the television every three to four months to compensate for the changes.

Brightness. The most basic controls on a television set, Brightness and Contrast, are mislabeled (LCD televisions are exceptions to this rule). Brightness actually controls the television's black level, or the cutoff point where grays become pure black. Setting this too low plunges too many levels of gray into black territory, robbing video of shadow detail and making video much too dark. Setting the brightness level too high makes pure black too gray, which gives dark portions of video a milky cast. Use a test pattern that displays a very dark gray block on a black background, drop the brightness all the way down, and then bring it back up until the gray block just becomes visible.

Contrast. As mentioned, the Contrast control on a television (sometimes labeled Picture), doesn't control contrast. Instead it controls the overall luminance, or brightness, of displayed video. A good way to adjust contrast is to use

a test pattern that displays a white block on a black background. Drop the contrast all the way down, and then raise it until the white block blooms, where the edges begin bleeding into the black background. Then gradually reduce the contrast until blooming is eliminated.

Sharpness. Most users crank the sharpness up too high because it creates an illusion of improved detail in video. In reality, detail can never be added to a video feed via sharpness, and turning the setting up too high results in jagged lines and excessive noise that hurt overall video quality. Sometimes it is best to turn sharpness to its lowest setting, but if possible use a test pattern that displays small text and diagonal lines and reduce sharpness until the text is legible and the lines are smooth. The picture may look somewhat blurry compared to what you are used to, but give it a few days and you'll see that video looks much more natural and detailed.

Turn off scanning velocity modulation. Scanning velocity modulation (sometimes called velocity modulation or simply VM) is a technology designed to improve image quality by sharpening the edges of on-screen objects. Unfortunately, in practice it tends to slightly blur video and can actually makes edges look worse. Turn this feature off using your television's menu if possible and enjoy crisper, more natural-looking video.

Choose a wide-angle mode. Most HDTVs use a 16:9 wide-angle aspect ratio. This is terrific for movies and content formatted for display on an HDTV, but standard television content designed for 4:3 aspect ratio displays is presented in letterbox format with black or gray vertical stripes on either side of the screen. Most TVs offer several modes that can stretch or zoom in on the content to make it fill the entire 16:9 display, but each involves compromises so it pays to know the differences.

To adjust the black level, use a test pattern like this one from the Avia DVD. When properly set, a faint gray bar should be visible in the pure black field on the left.

Most users crank the sharpness up too high because it creates an illusion of improved detail in video.

The most common stretched mode, often labeled Full, simply flattens out the 4:3 video so it fills the screen. This distorts each frame of video, making everything look wider than it is in reality, but is ideal for watching news programs or playing games because it doesn't cut off scrolling information, text, or graphics at the bottom or top of the display.

Some televisions fill the screen by stretching the edges of each video frame while leaving the center of the frame intact (this mode is sometimes called Wide Zoom). Again, this is OK for news broadcasts and video games because no information is lost from the edges of the screen, and newscasters and game characters that tend to be positioned in the middle of the screen don't get distorted as much as they would in Full mode.

Finally, there is Zoom mode, which blows up a 4:3 video frame until it fills the entire screen. This means the proportions of the video do not change, but portions of each video frame are cut off on the top and bottom of the screen. Video quality also is reduced because zooming in effectively makes each pixel larger, leading to grainy video. Zoom mode generally is a bad choice for video games because health meters and other critical information generally is positioned near the top or bottom edges of the screen and gets cut off.

Degauss. Any magnet that gets near the TV's frame (especially if it is placed directly on the screen) can deflect enough electrons from their paths to create ugly color blotches. Most speakers designed for home theater use are shielded and shouldn't pose a problem, but if you notice any color distortion near the edges or top of the screen where front surround sound speakers are located, move the speakers farther away from the TV or swap them for speakers with better magnetic shielding. Subwoofers generally are not shielded and contain extremely powerful magnets, so keep them as far away from the set as possible.

To get rid of blotches of color that do appear, try degaussing the set by turning it off, waiting a few minutes, turning it on, waiting several minutes, and repeating this process until the TV's internal degaussing equipment demagnetizes affected components. If that doesn't work, call in a professional who can use a more powerful external degausser to demagnetize the TV in minutes.

Avoid burn-in. If you have a CRT or plasma TV, avoid displaying static images on the screen for extended periods or they can permanently burn in to the

display, meaning they leave ghost images that are always visible. Be particularly wary of the station identifier "bugs" that appear in the lower corners of most channels as they remain in the same spot for hours and slowly wear out that portion of the display. Video games are another major cause of burn-in because they tend to contain static elements (character health indicators, compasses or maps, etc.) that remain on-screen for hours. Try to fill the entire screen with video whenever possible, and keep static images to a minimum (this includes pausing movies or live TV).

PIP/PAP. PIP (Picture-in-Picture), which displays one channel in a small window while another channel plays on the main screen, and PAP (Picture-and-Picture), which divides the screen in half to display two channels side-by-side, are convenient features when properly set up. Use a cable splitter to send a cable signal to multiple inputs on the back of the TV and you'll be able to see different channels simultaneously. Other options include running one of the cables from the splitter to a VCR or cable box, or using PIP or PAP to keep tabs on a channel when watching a DVD or playing a game.

TiVo Tips

DVRs (digital video recorders) like TiVo give users great command over the programs they watch, but if you're simply using yours to whip through commercials, pause live TV, and record a handful of shows, that expensive piece of equipment is little more than a glorified VCR. There's a lot of extra power lurking within those pages and pages of menus if you know where to look.

Record one, watch another. A cable splitter makes it easy to watch one channel while recording another using a single-tuner TiVo. Attach the splitter to the cable coming out of the wall and then connect one cable from the splitter to the TiVo (or your cable box), and the other cable directly to the coaxial jack on the back of the television. Use the TiVo normally, but if you want to watch a different channel without disturbing a recording, switch the input on the television to the coaxial port and use the television's remote control to change channels. When you want to watch TiVo again, simply switch the inputs back to the one where the TiVo is attached. Note that if you have digital cable you won't be able to watch scrambled channels using the tuner in your TV, but watching basic cable channels shouldn't be a problem.

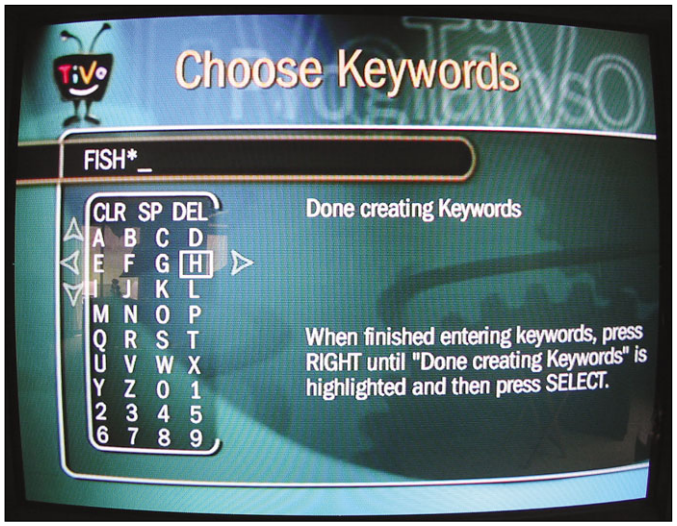
> A TiVo DVR can easily help you keep an eye out for your favorite actors, movies, TV shows, or other topics.

Create a wishlist. A TiVo DVR can easily help you keep an eye out for your favorite actors, movies, TV shows, or other topics. Just create a Wishlist using the keywords you want to keep tabs on and the unit automatically and continually scours program information for matches. Select Pick Programs To Record, select Search Using A Wishlist, and select Create A New Wishlist. Select the type of Wishlist to create (Keyword always works well), enter your keywords, and select Done Creating Keywords. Specify a category if you have a preference, and then select View Upcoming Programs to see if there are matches or Auto-Record to automatically record matches.

Reset a stuck TiVo. Every so often a TiVo locks up. The video or menu freezes, and the remote control becomes useless. There's no on/off switch, so the only way to reset the machine is to unplug it. Wait for 15 to 30 seconds before plugging it back in to give the internal hard drive a chance to spool down. Plugging the device back in too quickly stresses the internal components and can lead to more trouble down the road.

Add extra minutes. If a show routinely begins early or ends late, it's possible to set the TiVo to capture the entire recording. Just make sure you're not recording other programs immediately before (if you add minutes to the beginning) or after (if you add minutes to the end). Select Pick Programs To Record, select Season Pass Manager, select the program you want to modify, and select Change Recording Options. Now adjust the Start Recording or Stop Recording (or both) entries accordingly and save the changes.

Connect manually. If the TiVo fails to connect to the



Use wildcards (asterisks) during a TiVo search to find the programs you want to record. The search in this example will find all show titles that include the word "fish," such as "fishing" and "fisherman."

Internet and download program guide information, you can force it to try again manually. Select TiVo Messages & Settings, select Settings, select Phone & Network Settings, and select Connect To TiVo Service Now.

Go wireless. Dialing up to download program information is extremely slow, and in some areas a long-distance charge may be involved. If you have a wireless home network (see page 84 in this issue for tips on setting one up) it is easy to attach a wireless NIC (network interface card) to the TiVo and quickly download program guide information via a broadband Internet connection. Just attach a NIC that has a USB interface to the TiVo's USB port and select TiVo Messages & Setup, select Settings, and select Phone & Network Settings. Select Change Connection Type, select Network, and back up to select Edit Phone Or Network Settings. Select Wireless Settings, select Continue To Next Step, select the name of your wireless network (it should appear on-screen), continue to the next screen, and enter any necessary password or encryption information required by your wireless router.

Use TV Guide. TiVo units can display a TV Guide layout instead of the program layout provided by TiVo, and doing so presents more information in less space. Press Live TV, press Guide, press Enter, and change the Style entry from TiVo Live Guide to Grid Guide.

Improved searching through wildcards. Wildcards save a lot of time when searching for programs to record. The asterisk is the default wildcard character, so a keyword search for AIR* will find all programs containing the words airplane, aircraft, airpower, and every other combination that begins with air. To add a wildcard to a keyword, press the Slow button.

Direct-connect to a cable box. Most TiVo users use the included IR Blasters to send commands to a cable box, and if these infrared devices get bumped out of alignment, the TiVo won't be able to change channels. If your converter supports the feature, use the direct serial connection to attach the TiVo to the converter, giving it direct access to the channel controls for more precise channel-changing.

Progressive-scan DVD players output video that is much smoother than interlaced DVD output, so turn on this feature if your television supports it.

DVD Players

DVD players have come down so much in price that some DVD movies cost more than the cheapest DVD players we've seen, but just because everyone can now afford one doesn't mean everyone knows how to get the most out of it. If you think your DVD player looks and sounds great now, wait until you try out the following tips.

Most DVD players sold today can output video in progressive-scan mode, as opposed to interlaced mode.

Turn on progressive scan. Most DVD players sold today can output video in progressive-scan mode, as opposed to interlaced mode. Each frame of interlaced video is divided into two fields, one containing each odd horizontal line of the frame and one containing each even horizontal line. The first field is displayed for 1/60 of a second, and then the second field is displayed for 1/60 of a second, creating the illusion of 30 solid frames of video each second. Displaying video this way reduces overall brightness and creates artifacts such as jagged lines, especially when there is a lot of motion.

Progressive-scan mode gets around these limitations by displaying a solid frame of video every 1/30 of a second. If your television supports progressive scan, be sure to enable progressive-scan output from your DVD player for the best possible video quality.

Connections for progressive scan. As mentioned in the television section of this article, component video and DVI (Digital Video Interface) currently are the best possible video outputs, and DVD owners should use one or the other for the best possible picture quality. If you have a progressive-scan player (see previous tip) and a progressive-scan-compatible television, component video and DVI are the only types of connections with enough bandwidth to handle the progressive-scan signal. Enabling component or DVI output sometimes must be done using settings within the player, which means you may have to connect the DVD player to a TV using composite video connections to make the initial adjustments.

Output digital sound. All DVD players output digital surround sound tracks found in most movies, but you won't be able to hear them if you use the player's

composite audio outputs. If you have a receiver with optical or coaxial audio inputs, invest in an appropriate cable that lets you connect the receiver to one of the DVD player's digital audio outputs. Then use the player's menu (some also have physical switches on the back) to enable digital audio output.

Receivers & Speakers

Flat-panel displays have focused much of the attention lavished on home theater on video, but audio is still equally important if you want to create that movie theater experience in your home. Today's receivers and speakers are more powerful and complicated than ever, but learning to set them up properly can transform the sound of your music and movies.

Adjust speaker modes. Some receivers offer two or more speaker modes for each individual satellite speaker. In general, Small mode is designed for bookshelf or other small speakers that cannot output rich bass, and this setting redirects some or all of the bass to a subwoofer. The other common speaker mode is Large, which generally is designed for full-range speakers that do a good job of reproducing bass, as the setting directs some or all of the bass to the satellite speakers. Use the Small setting if you want to get maximum use out of your subwoofer, and use the Large setting to get the most bass out of your satellites (or if you don't have a subwoofer). Be careful because on some receivers selecting the Large setting turns off all output to the subwoofer, which rarely is desirable.

Equalize properly. For the best sound reproduction, don't go crazy with your equalizer. Try to keep all of the bands at or near the middle 0dB level, and consider reducing certain levels and raising overall volume instead of boosting certain levels and lowering overall volume. For example, if you want to boost low-frequency bass and high-frequency cymbals, instead of raising the low and high frequency bands, consider slightly lowering the midrange bands and turning the volume up slightly to compensate.

Select the right digital surround sound mode. Most movies and games come with soundtracks that can take full advantage of a home theater setup with 5.1 or more speakers (where the .1 represents a subwoofer). Check the box or case that a game or DVD comes in to see if it supports Dolby Digital or DTS surround sound, and select the appropriate setting on your receiver if it doesn't do so automatically. Some movies and games come with both types of soundtracks, so listen to bits of each and go with the one that sounds best on your system. The most modern receivers can handle Dolby Digital EX and DTS ES, which each output up to 6.1 channels of audio. Very few movies come with these types of soundtracks, and if you have a 5.1-channel system, the 6.1-channel audio is automatically downmixed to compensate.

Experiment with surround-sound modes, especially those that turn 2-channel audio into 5.1-channel (or more) audio to see which sounds best with your equipment.

Surround sound from two-channel audio. Today's receivers can expand stereo audio into surround sound to great effect, as long as users select the proper setting. Dolby Pro Logic II uses algorithms that separate stereo into front left, center, and right channels, as well as two rear channels, making it a great choice for a 5.1-channel system. If your receiver supports all of Dolby Pro Logic II's submodes, select Movie mode when watching programs and video games encoded in Dolby Surround, and use Music mode when listening to stereo recordings. Music mode has several subsettings of its own including Center Width, which diffuses sound across the front speakers, Panorama, which expands the surround sound effect, and Dimension, which shifts balance to favor the front or rear speakers (much like the Fade control works in a car).

Dolby Pro Logic IIx is a step up, as it can create faux surround sound for 5.1-, 6.1-, and even 7.1-speaker setups. Another common option is DTS Neo:6, which creates faux surround sound mixes for 5.1- and 6.1-speaker setups. Some companies also provide proprietary algorithms that upmix stereo or 5.1-channel sound to fill all the speakers in a 6.1-, 7.1-, 8.1, or even 9.1-speaker setup. Experiment to see which setting sounds best as each has its strengths and weaknesses.

Video upconversion. Many receivers contain circuitry that upconverts composite video to S-Video. Some high-end units even upconvert composite or S-Video signals to component signals. Don't let these capabilities go to waste if your television has S-Video or component video inputs; display all video using the best possible connection type.

Trust No One (But Us)

Internet forums are a great place for asking questions about the best way to fine-tune your hardware devices, but don't make the mistake of blindly following the advice of others. Settings that give them perfect results may be meaningless to you because of subtle differences in internal components that tend to happen throughout the production runs of electronics products. Although the model number for your TV may match up with the TV of the guy who is spouting advice, its internal boards and other components may not be exactly the same. Trust what you see and hear, not what an online stranger tells you. CE

BY TRACY BAKER

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A+ PANEL QUALITY

PC MAGAZINE 2002 BEST OF COMDEX FINALIST
Nov. 20, 2002 BenQ FP591
Hardware, Peripherals

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Pesky A/V Bugs

Home Theater Troubleshooting Tips Help You Swat 'Em

The room is dark, filled with anticipation, as the aroma of buttered popcorn wafts through the air. You pick up the trusty remote, push Play, and . . . something goes wrong. Count to 10 and read on; we'll help put the evening back on track as we examine a number of common home theater annoyances and how to deal with them.

TV Troubles

If the sight component of your sight-and-sound experience isn't what you think it should be, the cure is probably painless. We'll examine some of the most common ailments.

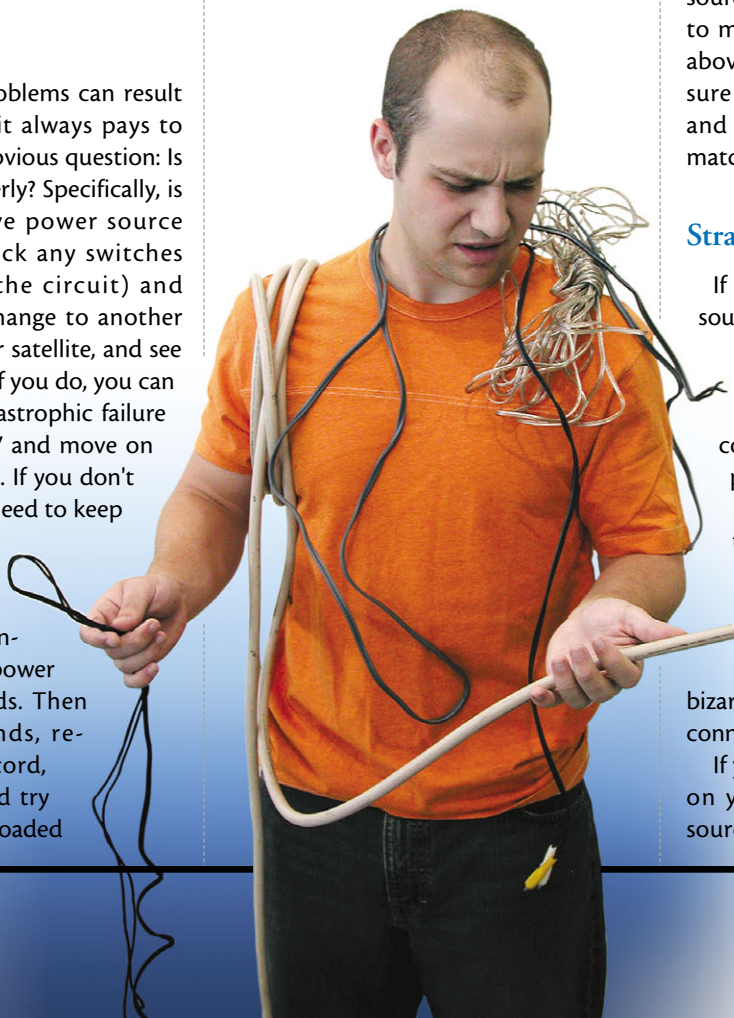
No Picture

Although many problems can result in a lack of picture, it always pays to start with the most obvious question: Is the TV working properly? Specifically, is it plugged into a live power source (don't forget to check any switches or power strips in the circuit) and switched on? If so, change to another input, such as cable or satellite, and see if you have a picture. If you do, you can probably rule out catastrophic failure on the part of the TV and move on to the next paragraph. If you don't have a picture, you'll need to keep hunting to narrow down the problem. Unplug the TV's AC power. With it unplugged, hold in the power button for 60 seconds. Then wait 60 more seconds, reconnect the power cord, power it back up, and try again. Today's gear is loaded with processing chips that can occasionally "crash" just like your computer does, and this simple "reboot" procedure often works wonders. If you still have nothing, it's probably time to call for help.

If the TV is working properly on other inputs, be sure it's set to the proper input for the source you're trying to watch, such as DVD. Also note that some TVs have multiple inputs for the DVD player, such as S-Video and component, and you must choose from a menu to match the TV to the actual connection you're using.

Once you've double-checked that your TV is OK, your inputs are working, and you've selected the proper match for the connections, but you still don't have a picture, you'll need to work backward from the TV. Check the connections of the cable that feeds the DVD signal into the TV. If the connections on the back of the TV are secure, check the other end of the cable where it plugs into the source device. (In this example, the DVD player.) As with the TV, some DVD players also require configuration within their menu systems in order to route the signal through a certain output. Check your owners manual to see if this is the case. For example, you may have set the DVD to output through the S-Video jack, but you're using the component output.

Finally, if you use a receiver or control center to route signals between the source devices and the TV, you'll need to make all the same checks discussed above, with respect to the receiver. Be sure all cables are securely connected and be sure all configuration settings match the actual connections in use.

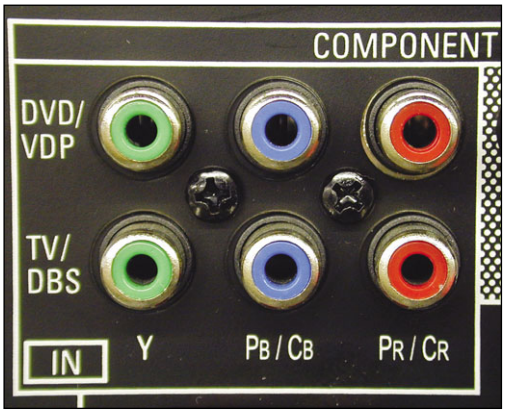


Strange Colors

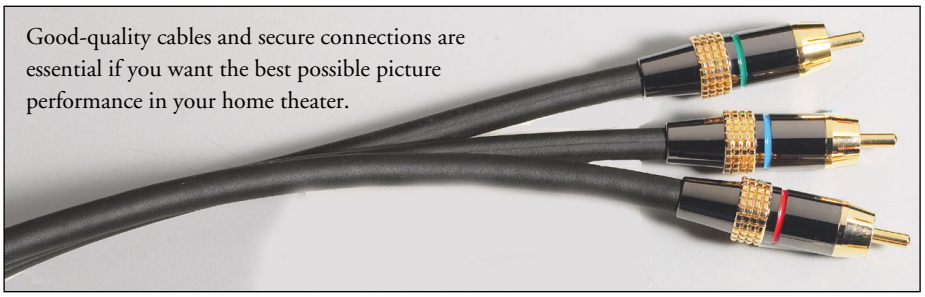
If your TV color looks right on some sources, such as cable or VCR, but you notice a strange color scheme when you're watching a DVD or HD set-top box, check your component video connection. Component video delivers its signal via a three-element cord. If any one of those three cables is not securely connected on both ends or if any of the connections are not plugged in to the proper jack on either end, bizarre coloring will result. Verify secure connections in the proper order.

If you're seeing similar color problems on your TV regardless of the input source (cable, DVD player, or network

television), the problem is probably on the TV side. You can probably correct problems, such as discolored flesh tones or other colors, by adjusting the set's hue and saturation. Splotches of color in different areas of the screen—this problem is limited to traditional CRT (cathode-ray tube) sets—are probably a result of exposing the TV to a magnetic field. Modern home theater speakers are shielded, but older speakers sometimes aren't and can generate a magnetic field strong enough to cause a problem. A qualified technician can easily correct these splotches.



Mismatched component connections will cause a bizarre color show.


Good-quality cables and secure connections are essential if you want the best possible picture performance in your home theater.

Graininess

The first thing to check when you encounter a grainy picture is the source. If it's cable, check that channel on another TV to see if the problem is present there, too. If it is present on another set, call a neighbor who's on the same cable system and ask if she sees the problem. If she does, call the cable company and report the issue.

If your neighbor doesn't have a problem, but all your TVs have grainy pictures, the problem is in your main cable feed. Likely causes are a poor connection or a component that has developed problems from exposure to weather. If you can safely access the point at which the incoming cable connects to your house, check that connection for a tight, corrosion-free fit. Another well-known culprit is the common splitter. Check the connection on the input side of the splitter, and if that doesn't correct the problem, replace the splitter. Also note that you can use splitters to multiply the analog outputs of digital satellite receivers and cable boxes, but you shouldn't use a splitter for the digital signals that feed into these devices.

If the problem is localized to one TV, check the connections between the input source and the TV. If cable is the input source, unscrew the cable fitting and retighten it. If a VCR (and the tracking is properly adjusted) or another device is the source, do the same if it's connected via coax cable and do it on both the device and TV ends of the connection. If you're using an RCA cable, unplug and reconnect the RCA plugs several times. Also try rotating the plug back and forth several times with it inserted most of the way into the jack. This back-and-forth motion is a simple way to free connections from signal-robbing oxidation that can build up over time between a plug and a jack, and it's a good idea to do this with all connections once a year as a maintenance measure.

Shadows & Ghosts

Most commonly seen in multi-CRT projected images, whether front-projected or as part of a rear-projection television set, **ghosting**, or shadowy edges, indicates a convergence problem. Proper convergence occurs when the three elements of a projected image (red, green, and blue) are calibrated so that their signals combine (converge) perfectly into a single image on the screen. Convergence can become maladjusted during shipping and can drift out of alignment over time. Fortunately, all multi-CRT projectors provide user-adjustable convergence.

Setting convergence may look complicated at first glance, but it's not. Some sets will display a single white "cross" in the middle of the screen. If the convergence is not properly adjusted, you will clearly see colored shadows outside the white lines. Follow the on-screen instructions to horizontally and vertically realign the colors. Red, green, and blue should combine to form a bright white cross with no significant coloring outside the lines. Other sets will display a grid across the entire screen, providing multiple adjustment points on the screen. Make adjustments, as outlined above, for each adjustment point.

Audio Annoyances

The home theater experience is as much aural as visual. When audio problems arise, you can usually track them to one of these common causes.

No Sound

Before troubleshooting audio problems, be sure the volume control is set to a reasonable level. It's easy to crank up the volume when you're experiencing sound problems and forget about it. You may damage your equipment, not to mention your ears, if you find the problem and restore the signal with the volume at a high setting.

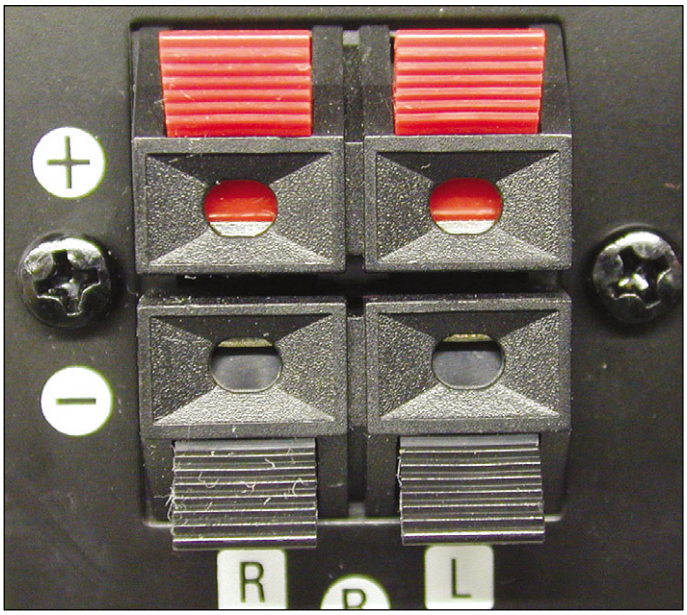
When you lack audio, first check to make sure the receiver is working by switching to another source such as the tuner or perhaps a CD player. If these other sources work, skip the next two paragraphs and continue.

If you still have no audio, switch off the receiver and check the speaker cables. Many speakers have spring-loaded connectors from which speaker wires are easily dislodged. The same goes for the receiver's speaker connections. Be sure you have solid connections on both ends and make sure the polarity is correct: Confirm red to red, black to black, or whatever color scheme your system uses. Switch the unit back on and check for sound. Confirm that any Tape Monitor settings are off. Make sure the speaker settings are properly configured.

Many receivers have outputs for multiple sets of speakers, and you can switch these different sets of speakers on or off. Some receivers have physical switches on the front panel, while others are in a menu system. If you still have no audio from any source, power the receiver off again, unplug the AC power cord, and hold the power switch in for 60 seconds. Wait another 60 seconds, reconnect the AC power, and switch the receiver on. If you still lack sound, your receiver may be in need of repair. Unless your receiver has user-serviceable components, such as fuses, and the instructions for replacing the components are in the owners manual, never attempt such repairs yourself. Never remove the cover from any piece of audio/video gear. You probably won't be able to fix the problem, and you don't want to risk electrocution, so call a professional.

If the sound is working on other sources, check the connections between source and receiver. Once you've verified that the connections on both ends are secure, gently wiggle the cable near the connectors on each end. If you hear crackling and popping or if the audio is intermittent, you probably need to replace a defective cable. If connections and cables are secure but you still don't have sound, you may have improperly configured something on the receiver, the source, or both.

Make sure you have selected the appropriate input on the receiver and remember that source devices that output digitally, such as DVD players or even some CD players, often provide that output in more than one way. For example, many DVD players can output a digital audio signal through either a digital coax connection or a fiber optic output, but they don't output through both at the same time. If you've set your DVD player to route its digital audio signal through its fiber optic output but you've used the digital coax output instead, you won't have sound. Likewise, most of today's home theater receivers can accept digital audio feeds via either coax or fiber optic, but you must select the appropriate input. The digital audio settings must match on both devices, and these settings are almost always handled through menu systems.



Many speakers feature spring-loaded terminals (pictured here) from which wires can easily escape when you move the speaker or wire.

Weak Sound

It's not uncommon to set up a home theater system and experience disappointing audio performance at first. Typical complaints are a "thin" sound, little or no bass, or sound that lacks a rich, robust nature. It's probably not the fault of your equipment, but you may have configured it improperly.

All modern home theater receivers are capable of decoding and playing Dolby Digital 5.1 soundtracks. The signal enters the receiver via a single cable, either coax or fiber optic, where it's electronically separated into its individual channels, amplified, and routed out to the speakers. There are five main channels (front left, center, front right, rear right, rear left) plus a dedicated subwoofer channel.

Many receivers have a speaker size setting that you configure within the menu system. Different receivers handle this issue in different ways, but we'll use one of the most common approaches, which is to offer two speaker size settings: large and small. This can be a bit confusing because it really has nothing to do with speaker size.

When set for large speakers, the receiver sends the full range of sound (bass, mids, and highs) to the main speaker channels, along with a lows-only signal to the subwoofer channel. In this configuration, a good subwoofer will certainly enhance your experience, but you'll still get good, rich sound through the main speakers even if you don't have a subwoofer.

If this setting is set to small speakers, however, the lows get routed only to the subwoofer channel, while the main speakers receive only mids and highs. If you don't have a subwoofer, the classic thin sound will result. Even when you have a subwoofer, the soundstage may

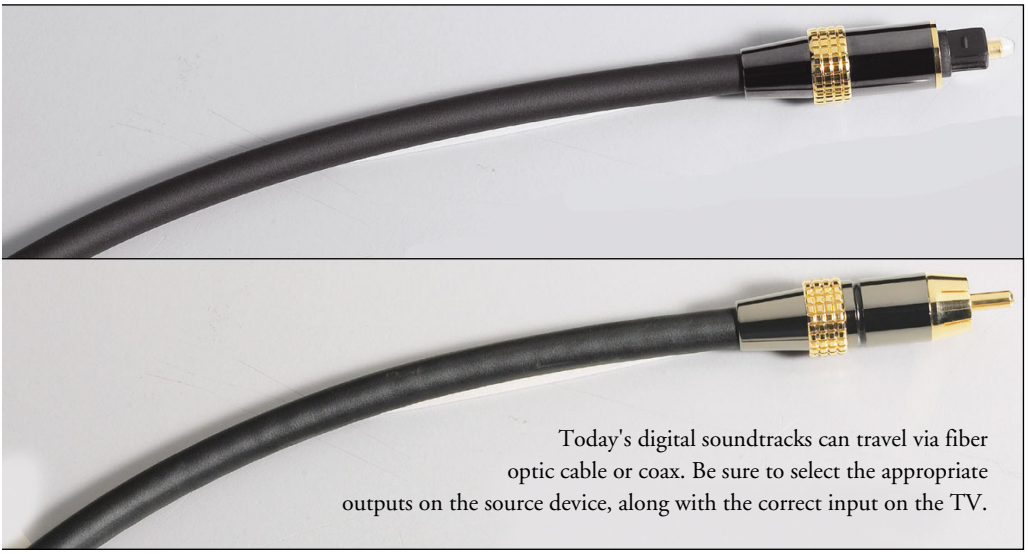
still have an unusual quality that's not pleasant. Unless you have a good reason not to, we recommend that you set the speaker size to large. Your main speakers will then have the full frequency range to work with.

Unbalanced Sound

A properly calibrated home theater system can be a wondrous aural experience, an immersive environment that draws you out of the mundane and into the on-screen world. Many home theater systems, however, just don't sound like they did on the showroom floor. Most of the time, it's not that the system or its components are inferior; it's simply not properly calibrated.

To remedy the problem, you'll need to buy or borrow a sound level meter, with which you can tweak the levels of the individual channels to match, as they should. Try RadioShack's 33-2055 digital meter ($49.99; www.radioshack.com). You can adjust a system with your ears, but it won't be accurate, and accurate calibration can make the difference between mediocrity and excellence. A properly calibrated, balanced soundstage often creates the sensation of an entirely new system, so dramatic can be the difference. There are two ways to calibrate. You can use the test tones built into your system and simply adjust the levels to match each other, or you can buy or rent a home theater calibration DVD, which has a set of specialized audio calibration signals, along with instructions. Ovation Software's Avia: Guide To Home Theater ($49.99; www.ovationmultimedia.com) and Joe Kane Productions' Digital Video Essentials ($24.99; www.videoessentials.com) are two popular choices. For information about professional calibration, see "Out Of The Box," an article about the ISF (Image Science Foundation) on page 51 of our May 2004 issue.

Calibration typically takes around a half-hour, and the results will amaze you.



Today's digital soundtracks can travel via fiber optic cable or coax. Be sure to select the appropriate outputs on the source device, along with the correct input on the TV.

Audio Hum

A constant, low-frequency hum or buzz is probably the age-old "60Hz hum." Without getting too technical, this hum usually has its source in the AC power lines in your home. Try plugging your equipment into a different outlet or spread the equipment power among several different receptacles' outlets. Also be sure that signal cables and speaker cables are as far away from power cords as possible. If they must be near each other, try to have them cross each other at right angles and always avoid parallel placement as much as possible.

Distorted Sound

When you hear distortion, the first thing to check is the volume. If it's cranked, and reducing the volume eliminates the distortion, you're up against the technical limitations of your gear. Regardless of whether the amplifier or speakers are causing the problem, there's nothing to do but lower the volume level or buy new gear.

If you're already at a moderate volume and you hear distortion, check to see if it's occurring in one speaker or more than one. If only one is producing distorted sound, check the speaker cable connections on both ends. If they're secure, try temporarily swapping the speaker wire between that speaker and one that's operating properly. If the same speaker is still distorted, the speaker is probably defective. If the previously clean speaker is now distorted, first replace the speaker wire. If the distortion persists, the distortion is in the signal itself, indicating a problem in either your amplifier/receiver or the source. Try another source. If the distortion persists, it's the amplifier/receiver. If not, it's the source device, be it a CD player, VCR, etc., or its cable. First replace the cable that connects it to the amplifier/receiver. If the distortion is still there, the source device has a problem.

Distortion across multiple speakers may also indicate a problem with the amplifier/receiver, but it can also be the result of a reversed-polarity connection somewhere in the system. Be sure all speakers are corrected properly with regard to positive and negative. Match red to red, black to black, or whatever color scheme is in use in your system. One reversed speaker wire in a system can cause distortion, an unbalanced soundstage, and generally poor audio quality across an entire five-speaker array.

Source Struggles

One little problem can be a major annoyance in the home theater experience, but you need not put up with it. Find that bug and squash it!

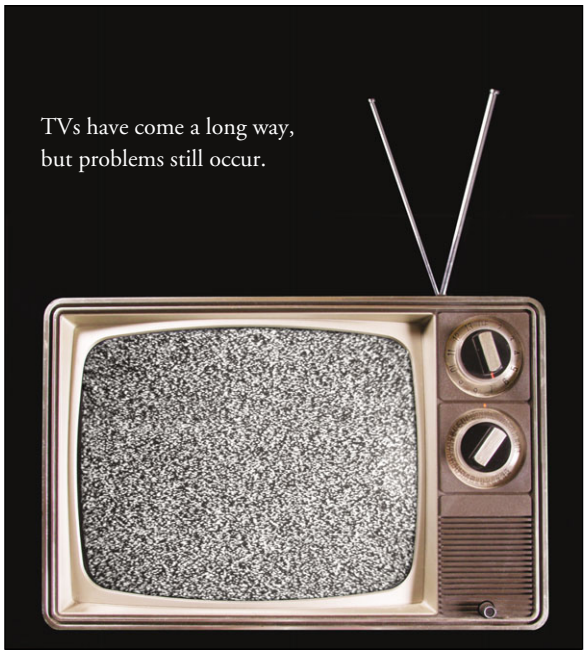
Skipping DVDs

Audio CDs have spoiled us, no doubt about it. The format has proven durable and, in most cases, quite tolerant of minor scratches and scuffs. It is a mistake, however, to assume that DVDs share that tolerance. Although they look like CDs, they are different, and they're much more sensitive to abuse. A scratch that wouldn't even cause a CD to hiccup may cause skipping and may end your movie session for the evening.

Handle DVDs with care, always by the edges. Use a dry, soft cloth to remove any smudges from the shiny surface. A disc repair kit is an inexpensive investment and a good thing to have on hand. For instance, the Maxell CD-325 Value Pack includes disc and laser lens cleaning supplies ($16.99; www.maxell.com). If, however, you find yourself without one in the middle of a movie, try using a soft cloth and a dab of toothpaste to polish a scratch away, working from the center of the disc out in straight careful motions.

Also note that the label side is actually much closer to the data layer; deep scratches on the label side can damage the disc beyond repair.

If you're having trouble playing most discs you put in your player, the problem could be in your player. If the player's read lens is accessible, gently wipe it clean with a soft, dry cloth. If it's not accessible, try a disc cleaner, such as the Allsop Laser Lens Cleaner ($10.99; www.allsop.com).



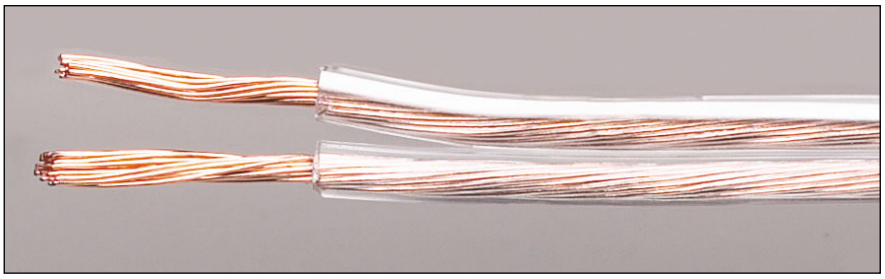
TVs have come a long way, but problems still occur.

"Trashy" Satellite Picture

Most of today's consumer satellite systems are digital and, when properly configured, produce a splendid image most of the time, but there are limitations to the format. The signal arrives at your dish in the form of a digital bit stream: 1 (ones) and 0 (zeroes). As with most digital signals, if it's strong enough to work, it's usually great quality; digital transmission and reception are much more all-or-nothing in nature, not subject to the same maladies of weak reception that can affect traditional analog signals.

It is possible, however, for a digital signal to be right on the border between acceptable and unacceptable. In this case you may experience intermittent loss of picture (and sound), or the picture may freeze, jerk along, or show blocky artifacts. This happens during heavy cloud cover, but if you're seeing it during clear weather conditions and you're certain that your dish's view of the satellite is unobstructed, you may have a dish alignment problem. Go into your satellite receiver's setup menu and find the signal strength meter. It shouldn't fluctuate a great deal, and it shouldn't be much below mid- to high-80s (on a percentage scale). If it fluctuates, you'll need to realign your dish. The satellite programming providers, mainly DirecTV (www.directv.com) and Dish Network (www.dishnetwork.com), provide tools on their Web sites that will give you the proper aiming coordinates for your geographic location.

Finally, although these systems do a good job, their bandwidth is limited and certain artifacts will be present in the picture of the most perfectly tuned system. As a rule of thumb, the busier the picture with motion and detail, the more the picture will suffer. Common imperfections include a trashy, garbled look in areas of small detail, especially small detail in fast motion. Edges in motion may also suffer from jaggies or from a stair-step effect. Until the technology improves, we'll have to live with these limitations.



Speaker wires must always be connected in proper polarity. Connecting a positive receiver terminal to a negative speaker terminal can degrade and distort the entire system. All speaker wires are marked so you can match polarity. Look for a small ridge or marking on one side of the speaker wire and use this identifier to maintain order.

Get Back On Track

Most home theater problems are simple configuration or wiring issues. With a little time and patience, they can be eliminated and the show can go on. CE

BY JERRY HATCHETT

Glossary

AC3—AC3 is the third-generation codec used by the Dolby Digital audio format to encode multichannel soundtracks.

amplifier—An amplifier boosts the sound level of an audio source.

aspect ratio—The ratio of width to height of a computer or television screen. For instance, HDTV has a 16:9 aspect ratio, while standard definition TV has a 4:3 aspect ratio.

ATSC (Advanced Television Systems Committee)—A nonprofit organization that develops voluntary standards for standard and digital TV systems. The ATSC was formed in 1982, and many of its standards were adopted by the FCC in 1996.

AUX inputs—Short for auxiliary, you'll find these inputs on most TVs and receivers.

calibrate—The process of testing and tweaking settings against a set standard to ensure a device, such as a television, is working properly.

channel—A discrete audio path for playback and recording usually restricted to a specific frequency.

coax (coaxial cable)—Usually a single strand of wire wrapped in a thick sheath with threaded connectors. Also referred to as RG-6 cable.

component video—A method of separating the information in a video signal, such as the luminance from each of the colors (chrominance), by giving each part (or component) of the signal its own line in a video cable. This makes the final output on-screen much sharper than that of a composite signal, especially in the image's vertical lines.

composite video—Composite signals carry all necessary video information, such as color and horizontal and vertical scanning, in the same signal rather than in different signals.

CRT (cathode-ray tube)—The display screen used in most televisions and standard computer monitors. An electron beam moves across the back of the screen, lighting up phosphor dots inside the glass tube, which causes an image to be displayed.

DLP (Digital Light Processing)—A newer technology, used primarily in projectors, designed to give sharp images, regardless of the lighting in the room. DLP uses a small chip to manipulate video signals instead of using CRTs.

DSP (digital signal processor)—A special circuit created to allow high-speed data transmission and manipulation, particularly in communications and graphics-intensive and audio-intensive applications. A/V receivers use DSP to simulate certain acoustic environments such as concert halls, churches, etc.

DTS (Digital Theater Sound)—This six-channel sound format is comparable to Dolby Digital.

DVI (Digital Visual Interfaces)—A standard for transmitting and receiving high-quality digital video to computer displays and TVs without having to convert the signal to analog first.

equalizer—Equalizers adjust the audio output from a receiver to compensate for a room's acoustic properties.

fiber optic—Glass or plastic fibers that transmit data in bursts of light. TosLink cables are a common use of fiber optics in home theaters.

HDCP (High-Bandwidth Digital Content Protection)—An encryption specification that controls the use of HD content.

HDMI (High-Definition Multimedia Interface)—The successor to DVI, HDMI is an interface that supports uncompressed, all-digital audio and video.

HDTV (High-Definition TV)—A TV standard that generates crisper, cleaner, and clearer images than conventional televisions and will likely provide for hundreds more channels. In the United States, HDTV incorporates digital broadcasting signals.

interlaced scan—The process of displaying video by splitting each frame of video into halves called **fields**; each odd row of pixels displays for 1/60 of a second (field one), followed by each even row for 1/60 of a second (field two). This creates the illusion of a solid frame of video every 1/30 of a second, but drawbacks to this method include artifacts when there is a lot of motion in the video, decreased brightness, reduced video clarity, and flickering. The "i" in a resolution means interlaced; for example, 480i indicates 480 interlaced lines of resolution, and 1080i indicates 1080 interlaced lines of resolution.

letterbox—When widescreen video formats display on TVs with 4:3 aspect ratios, the video source adds blank, horizontal stripes to the top and bottom of the screen to preserve the proper viewing ratio at the expense of screen real estate.

LFE (low frequency effects)—LFEs are the explosions and rumbles on film and video. Although many speakers can reproduce these sounds, most home theaters use a subwoofer for this task.

MPEG (Moving Pictures Experts Group)—An organization that defines various video compression standards, such as DVD's MPEG-2.

NTSC (National Television System Committee)—Created the standard definition television format, and its acronym is commonly used to refer to standard-definition content.

PIP (picture-in-picture)—On a TV that supports PIP, you can view video in a small window (typically a different TV station) on a larger screen that's simultaneously displaying video.

progressive scan—In contrast to interlaced scan, progressive scan creates all of a video image's vertical lines in one pass. The result is a sharper, brighter image.

RCA jack—Audio (and video) connector first popularized by RCA (Radio Corporation of America). RCA connectors feature a single prong surrounded by a grounding cap.

receiver—A combination of an amplifier and an AM/FM tuner. A/V receivers also support audio inputs from DVD players, VCRs, set-top boxes, and other home theater devices.

splitter—A small device that splits a coaxial cable signal into two paths. A splitter lets you use one connection with two devices.

subwoofer—A speaker optimized for creating LFEs. Subwoofers usually feature a single, large speaker cone and are either passive (relying on the receiver for amplification) or active (using a built-in amplifier).

terminals—Terminals are where you connect electronic components. Also known as binding posts, screw terminals, or spring clips.

The Near & Far Of It

Hyperfocal Distance Maximizes Your Camera's Reach

If you've been following our photography articles, you may have noticed that the term depth of field comes up fairly often. The **depth of field** is the region of a photo that's in acceptably sharp focus. The greater the depth of field, the more extensive that focused region will be. You'll achieve the greatest possible depth of field by focusing your camera on its hyperfocal distance point.

Before we get into what hyperfocal distance is and how to figure it, let's review some basics about depth of field (DOF, from now on), which is influenced by three primary factors:

1 **Distance from subject.** The closer you are to your subject, the shorter the DOF will be, and vice versa.

2 **Aperture setting.** The lower the aperture's numerical setting (also known as the f-stop), the wider the lens opening is, and the shorter the DOF will be. Higher settings will progressively constrict the aperture, lengthening the DOF and bringing more of the background into focus with the subject.

3 **Lens focal length.** This is the distance from the optical center of a lens set on infinity () to the point at which the image is focused on the film or, in a digital camera, the image sensor, and is measured in millimeters (thus, a 50mm, 28mm, or 100mm lens). The shorter a lens' focal length, the greater its DOF. This is why wide-angle lenses, which utilize short focal lengths such as 24mm, do the best job of capturing landscapes and other detailed expanses.

Like composition, DOF is an aesthetic choice that you should consider in most photo-shooting situations. (Assuming, of course, that your camera is sufficiently advanced to let you control it.) The hyperfocal distance, on the other hand, typically figures in only when significant distances are involved (for example, outdoor shots such as landscapes, or indoor locations such as arenas and concert halls), and you want to clearly capture as much of the area as possible from the foreground outward.

Among beginning, and sometimes even intermediate, photographers, it's a common but understandable misperception that focusing on infinity will bring the largest area into focus. Not so—you can do even better using hyperfocal distance settings.

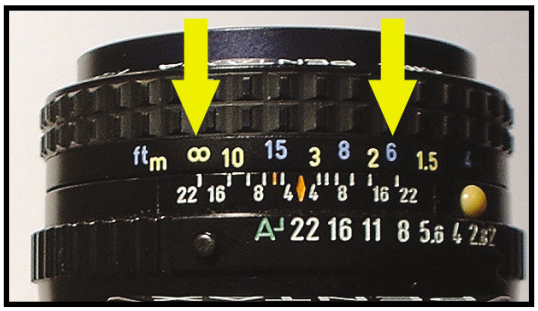
Hyperfocal Distance Defined

When you focus a lens on infinity, the hyperfocal distance (HFD, from now on) is the nearest point that appears sharply defined. In other words, it's where the DOF begins. Because you're focused on infinity, there's no practical end to the DOF. Theoretically, objects in the far distance are still in focus; they're just too small to make out clearly.

Now, if you instead focus the lens on the HFD itself, you'll not only keep the background in sharp focus, you'll bring more of the foreground into sharper definition, as well. The DOF will now begin at half the HFD. A couple of pointers: When you're focusing on the HFD, be sure to turn off your camera's autofocus feature. That way, if you reframe the shot, the camera won't undo your work by refocusing elsewhere. Also, once you've set your lens for the HFD, it's good for as long as you leave the f-stop setting and focal length unchanged. So feel free to move around and shoot without worrying about having to refocus at each new location.

The HFD is not, however, a one-size-fits-all value that you can automatically apply to any situation. Rather, it varies according to some of the same factors that determine DOF: lens focal length and aperture setting. That's because the longer a lens' focal length, the narrower its angle of view is, and the farther away it pushes DOF and thus the HFD. Conversely, the shorter the lens, the

Hyperfocal distance is easiest to calculate on the spot when you're using a film camera whose lens barrel has a distance scale. These close-ups demonstrate the two-step process. In the top shot, with the aperture set to f/22, we've focused the lens on infinity. By checking the depth of field scale (the middle ring) to pinpoint where f/22 aligns with the distance scale (the outer ring), we learn that f/22 puts the hyperfocal distance at approximately 12 feet. Thus the depth of field extends from 12 feet to infinity. In the bottoom shot, we've readjusted the focus to 12 feet. Now the in-focus region begins around 6 feet away and extends to infinity.



wider its angle of view, and the closer it brings DOF and the HFD. As well, we've mentioned above how narrowing the aperture extends DOF. So, to get the most out of focusing on the HFD, you would combine a short focal length (such as 35mm) with a narrow aperture (such as f/16 or f/22).

Some quick numbers, to illustrate: Let's say that you're focused on infinity and you determine that the HFD is 16 feet from your position. By adjusting the focus to 16 feet, the DOF now begins at just 8 feet away. Congratulations! You've taken a DOF that originally ranged 16-feet-to-infinity and expanded it to 8-feet-to-infinity.

As for how to determine HFD under particular shooting circumstances, it can be quite simple, or a slightly more involved process, or pretty challenging, depending on your camera gear and—brace yourself—your math skills.

Hyperfocal Distance Made Easy

If you're using a film camera whose lens features a **distance scale**, you have everything you need. Also known as a **depth of field scale**, these are adjacent markings on the fixed and rotating rings of the lens barrel. The distances that align with the markings (corresponding with the f-stop) on either side of the focus mark show the region (in feet and meters) that will be in acceptably sharp focus.

Distance scales were once widely used on film SLRs—so you're likely to find them on older gear—but with the advent of digital photography, some manufacturers began omitting them. However, distance scales appear to be making a return lately, at least on professional and "prosumer" equipment.

So, in the interest of starting simple, let's cover the quick, two-step process of locating the hyperfocal distance with a film SLR whose lens has a distance scale:

First, after focusing your lens on infinity, check the scale to learn the distance that aligns with your f-stop setting. Next, adjust the lens so the focus mark now aligns with that particular distance, instead of aligning with infinity.

For example, let's say you're using a standard 50mm lens and have set its aperture to f/22. When focusing on infinity, the DOF distance that aligns with f/22 is around 12 feet. After readjusting the focus to 12 feet, the distance scale's f/22 marks now show a DOF ranging from 6 feet to infinity.

That's all there is to it. Because this procedure relies on visual feedback, it's easier to demonstrate than explain, so we refer you to the accompanying pair of close-ups of a standard 50mm lens.

The Digicam Difference

Even if you're shooting with a film camera whose lens lacks a distance scale, it's still easy to pinpoint the HFD using one of the methods we'll be covering in a moment. Film comes in just a few sizes: 35mm, by far the most popular consumer format, as well as larger formats such as 6 x 6cm (classified as Medium Format) and 4 x 5 inches (Large Format). Because the variables required to calculate the HFD are directly related to these standardized sizes, this means that, for film cameras, HFD is determined by the camera's film format, not the camera itself.

With digital cameras, things get more complicated. The kind of standardization we see in film formats doesn't apply to the image sensors in digicams. In most cases the sensors are smaller than a frame of 35mm film. As of this writing, there are only two digital cameras, both released in 2003, whose image sensors are full-frame . . . that is, the same size as a 35mm film frame: Kodak's DCS Pro SLR (www.kodak.com; $4,995) and Canon's EOS-1Ds (www.canon.com; $8,999). And not only are the sensors usually smaller, their sizes can vary greatly among manufacturers and from model to model. About the closest we can get to a correlation with 35mm cameras is with digital SLRs (apart from the cited Kodak and Canon models), which often use a sensor around 2/3 the size of 35mm film.

If you know your digicam's LMF (lens multiplier factor), you can still calculate the HFD by applying the LMF to the values for a 35mm camera. (The LMF is a number that, when multiplied by such measurements as focal lengths, provides the digicam's equivalency to a 35mm camera.) For example, if your digicam has an LMF of 1.5 (common with digital SLRs), and you know that on a 35mm camera, with the same settings, the HFD is 6 feet, you would multiply 1.5 x 6 for a HFD of 9 feet.

At top, we've set our 50mm lens at f/2, its widest possible aperture, and focused on the immediate foreground. In the middle, still at f/2, we've focused on infinity. Both produce shots with narrow depths of field, and neither result is particularly satisfactory. At bottom, we've changed the aperture toward the other end, f/16, and focused on the hyperfocal distance, resulting in a shot that has clear details throughout its full depth.

With more compact digicams, which sometimes use lenses of very short focal lengths, you'll often find that depth of field is naturally quite extensive, in some cases making the HFD a less critical issue.

Chart Your Course

Even if your camera lacks a distance scale, you can still find out the proper HFD for many shooting situations pretty easily. All you need to do is consult a chart.

You can find HFD charts in books and photo supply stores. You'll find one much closer at hand, too. In this article, we've included a chart you can clip or copy. Keep it in with your camera gear so you'll always have it when you need it.

Several charts are online, as well, available to download for free. *Vivid Light Photography* magazine provides a good one in Adobe's PDF format (www.vividlight.com/pdf/hyperfocal.PDF). It covers standard aperture settings at 10 focal lengths, from ultra-wide-angle lenses to telephoto focal lengths of 200mm. There are separate charts for 35mm and digital SLRs, as well as 6 x 6 and 4 x 5 formats.

Once you know the HFD, what then? After all, with a built-in distance scale, you're focusing the lens at the same time as you're figuring the distance. Unfortunately, a chart isn't that full-service.

You have two basic options: (1) Focus on an object the proper distance away, which means you might have to first pace off the measurement, although that's likely to result in a loose estimate. For more exacting work, if you're shooting with a friend, you might use a tape measure to pin the distance down better. Or you might consider investing in a handheld rangefinder, which is essentially a laser pointer that reads distances; (2) Use a camera that lets you tell it what distance to focus on. Many of Nikon's Coolpix models, for instance, have this feature: By using a combination of a multifunction button and the command dial, you internally set the focus to the distance you want.

Crunch Your Own Numbers

If you don't mind breaking out a pocket calculator on the spot, you can work up the HFD from scratch with this formula:

$$\text{HFD (in feet)} = \frac{L^2}{F \times CoC} \times 0.0033$$

Where:

L = Lens focal length

F = F-stop setting

CoC = Diameter of the circle of confusion in millimeters (more on this below)

0.0033 = Conversion factor to change millimeters to feet

Returning to the earlier example of our 50mm lens set to f/22, let's see how this works out:

$$\frac{50 \times 50}{22 \times 0.03} \times 0.0033 = 12.5 \text{ feet}$$

In practical terms, it's the same as the results from using the lens' distance scale.

Circle of confusion. Sometimes known as the circle of least confusion, this is a value that varies according to the film format or model of digital camera. In a nutshell, it involves gradations of acceptable focus accuracy when shooting a scene or object with depth, rather than a flat surface.

For 35mm film SLR cameras, the generally accepted CoC value is 0.03, and 0.02 is often used for digital SLRs. For other digicams, it can vary considerably. Fortunately, there's an online resource (dfleming.ameranet.com/digital_coc.html) that lists CoC values for dozens of different models.

If you know the dimensions of your digicam's image sensor, you can figure your own CoC, using these formulas:

$$\text{CoC} = \frac{1}{1300/D}$$

Here, D is the diagonal measurement (in millimeters) of the image sensor. Calculating the value of the image sensor's diagonal measurement goes back to high school geometry and finding the hypotenuse of a right triangle:

$$D = \sqrt{W2 + H2}$$

Here, W and H are the width and height (in millimeters) of the image sensor.

To illustrate, let's say we have a camera whose image sensor measures 24 x 16mm, dimensions you might find on a typical digital SLR:

$$D = \sqrt{\text{v } 242 + 162} = 28.8444$$

Now, plugging that into the CoC formula, we get:

$$\frac{1}{1300/28.8444} = 0.022$$

Which is very close to the rounded-off value used as a general rule of thumb for digital SLRs.

Enough Theory, Now Practice

When you're trying to wring as much depth out of a scene as you can, focusing on the HFD is a good start, but there's more you can do to take the best picture possible.

Use a tripod. Because your goal is to shoot a photo with a maximum amount of crisp detail, you'll need to minimize any risk of camera movement, however slight, that could result in fuzziness or blurring. So, if at all feasible, use a tripod to keep the camera stable. Also, by using the camera's timer or a cable release to activate the shutter, you can avoid any movement caused by finger pressure on the shutter release button.

This is good practice in any situation when you can afford to take your time and carefully set up your shot. But it's particularly critical when you're after the maximum DOF. Because of the aperture's effect on DOF, you'll likely use a high f-stop setting. However, this results in a small aperture, admitting less light and requiring a slower shutter speed for an optimal exposure. And a slow shutter speed means more risk of movement, without taking the proper precautions.

Avoid the smallest aperture. Because of a light-bending phenomenon called diffraction, lenses perform their worst at the smallest aperture settings. Unless you're clawing for every bit of ground possible, try an f-stop or two away from the top end. On our 50mm lens, that would be f/16 rather than f/22.

For most photographers, hyperfocal distance isn't like lighting or composition—something that factors into each and every shot. You can forget all about it when you're doing portraits, candids, and other close-up work. But understanding HFD, and how to determine it, will definitely help you squeeze more out of your long shots. CE

BY BRIAN HODGE

Clip 'N Save

If your camera lenses don't have distance scales, you can use our handy hyperfocal distance chart to quickly determine the hyperfocal distance for several f-stop and lens focal length settings. Just clip or copy this chart and stick it in your camera bag. The hyperfocal distances listed here are in feet.

f-stop	Focal Length							
	20mm	24mm	28mm	35mm	50mm	80mm	100mm	200mm
f/4	10.9	15.7	21.4	33.5	68.4	175	273.4	1093.7
f/5.6	7.8	11.2	15.3	23.9	48.8	125	195.3	781.2
f/8	5.5	7.9	10.7	16.7	34.2	87.5	136.7	546.8
f/11	4	5.7	7.8	12.2	24.9	63.6	99.4	397.7
f/16	2.7	3.9	5.4	8.4	17.1	43.7	68.4	273.4
f/22	2	2.9	3.9	6.1	12.4	31.8	49.7	198.8

CE Tips - August 2004

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CE DEJARGONATOR: Parallax Error

One of the best things about digital cameras is that the LCDs on the back show exactly what the CCD (charge-coupled device) used to take pictures "sees." That way, when you snap the picture, you know exactly what you're getting. Unfortunately, LCDs become practically unusable in direct sunlight because of glare, forcing you to rely on the viewfinder to frame shots. The problem with relying on the viewfinder is that, often times, what you see in the viewfinder doesn't match the printed version of the image.

The difference between what you see in the viewfinder and what shows up in the picture is called a **parallax error**. It happens because, most of the time, the optical viewfinder doesn't share the same view path as the lens. The lenses used in most consumer-level viewfinders tend to be cheap, as well, made of plastic instead of high-quality glass, which also contributes to parallax error.

SLR (single-lens reflex) cameras use special mirrors or prisms to display exactly the same image in the viewfinder as the one that will be recorded to film or digital media when you take the picture. If you want to avoid parallax error, use an SLR camera or frame shots using the LCD on the back of your point-and-shoot digital camera. If you need to use a viewfinder that causes parallax error, move closer to or zoom in on your subject to compensate. The only good thing about parallax error is that it is predictable, so a little practice makes it easier to frame the shot you want. Otherwise, use an image editor, such as Adobe Photoshop or JASC Paint Shop Pro, to crop digital images to your liking before you print them.

A Demo Error

The picture below shows the effects of parallax error. The portion of the image inside the red box is what was seen in the viewfinder before the shot was taken. The portion of the image outside of the red box represents the parallax error, or the amount of area included in the final picture that wasn't visible in the viewfinder.

BY TRACY BAKER

Picture Perfect

Turn Your Digital Images Into Fantastic Prints

There are many benefits to using a digital camera instead of a film camera. For instance, with a digital camera, you can see each photo on the camera's built-in LCD screen and discard it if it is bad without bothering to print it. Digital snapshots can be touched-up, appended with captions, and stored in virtual shoeboxes with a variety of software.

Also, you can easily share a digital photo with friends and family through email or via Web-based photo-sharing services. Nevertheless, a strictly digital photograph has downsides, too. For instance, PC hard drives can crash, destroying the photo files. The reusable memory cards that function as digital film also are not ideal for archiving. Finally, it is less than satisfying to view a picture on a screen.

Most people want to hold a photo in their hands. So, ultimately, it is best to print the digital photographs that you want to keep, just like you would a picture taken with a film camera. All digital photo prints are not created equal, however. Notwithstanding your skills as a photographer or the capabilities of your camera, the quality of your digital photo prints will depend on several factors. If you make the prints at home, these factors include the kind of printer you use and, in the case of an inkjet printer, the types of paper and ink you use. You may also need to make some adjustments to your printer's settings. Or, if you want to utilize a photo print service (either online or at a retail location) there are other factors to consider, including the service's printing process.

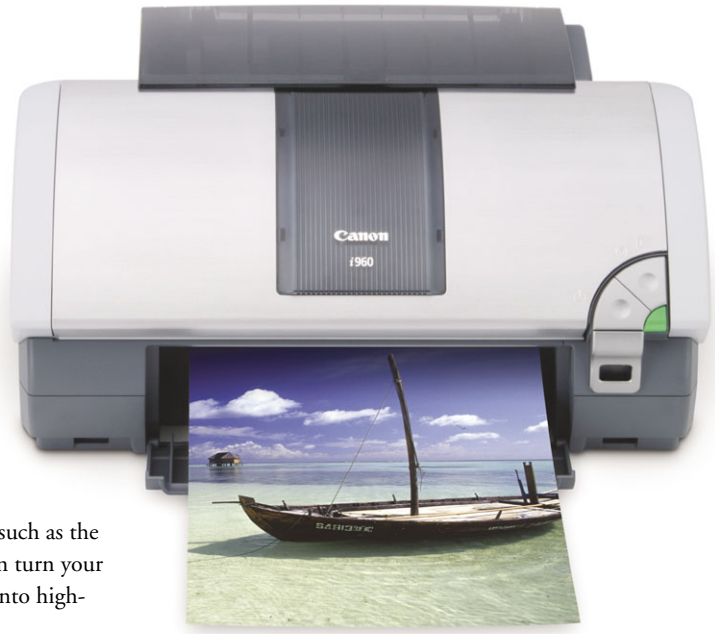
Select A Printer

Essentially, there are three kinds of printers capable of producing photos: inkjet, dye-sublimation or thermal dye-transfer, and laser. Among inkjet printers there is further differentiation. The least expensive inkjet printers—those that are free or almost free—usually are dual-purpose machines that produce decent text and print photos well, says Sally Wiener Grotta, vice president of DigitalBenchmarks (www.digitalbenchmarks.com), a digital camera and imaging test lab and consulting service. But generally these printers hold only three color ink cartridges or a single cartridge with three color ink chambers (for cyan, magenta, and yellow inks) plus a black ink cartridge. And to print a photo with one of these printers, the user may have to replace the standard color inks with specialized photo inks, Grotta says.

By comparison, specialized inkjet photo printers accommodate more color ink cartridges (some hold as many as eight) and can be adjusted to produce better photos. These printers will produce much better photos than the inexpensive inkjets and also do a great job printing text, Grotta adds.

Regardless of cost or brand, all inkjet printers produce photos in the same manner. In the inkjet printing process, the printer sprays droplets of ink onto the paper through a print head that contains hundreds or thousands of tiny nozzles. The more nozzles there are on the print head, the more consistently the ink will be spread on the paper, and the faster the printing process will be completed. Each droplet can contain only one color. However, some inkjet printers can lay multiple droplets of different colors, one on top of another. The final photo comprises thousands of tiny contiguous dots formed by the ink droplets.

Dye-sub/thermal dye-transfer printers do not use ink at all. In these printers, the print head heats a polyester film that has been infused with cyan, magenta, and yellow dyes to transfer the dyes one color at a time to special photo paper, which has been matched to the printer. The layers of color combine to form the photo image. The result is what experts call a "continuous-tone" image, which, upon close inspection under a magnifying glass, appears to be one uninterrupted plane of color. In this way, a dye-sublimation or thermal dye-transfer print is like a photo made from film. Both film photo



Inkjet printers such as the Canon i960 can turn your digital photos into high-quality images.

Dye-sublimation printers such as the DPP-EX7 from Sony use an entirely different technology than inkjet printers.

finishing and dye-sub printers create continuous-tone images, although the dye-sublimation printing process is technically very different from the process for developing and printing photos from film. Dye-sub/thermal dye-transfer printers produce "spectacular-looking photos," says Grotta.

Color laser printers are a third option, although they are primarily designed to print text and business graphics, not photos. Also, laser printers cost more than the inkjet or dye-sub/thermal dye-transfer alternatives. Although the purchase price of a color laser printer may be less than $500, you can buy a top-quality inkjet photo printer or a dye-sub or thermal dye-transfer printer for less than $300. Normally, a color laser printer will contain four toner cartridges, one each for cyan, magenta, and yellow colors and one for black, Grotta says.

All laser and most inkjet printers can print both photos and text, although one inkjet model, the Epson PictureMate, prints only photos. Dye-sublimation or thermal dye-transfer printers always are photos-only printers, and most produce only 4- x 6-inch photos.

You can determine what type of photo printer to choose by thinking about how often you plan to print your digital photographs and how many photos you plan to print at a time, as well as the cost of the supplies the printer consumes. In general, it costs less to use an inkjet photo printer than it costs to use a dye sub/thermal dye-transfer printer. (See the "Send Out For The Perfect Prints" sidebar for more information.)

Proper Setup

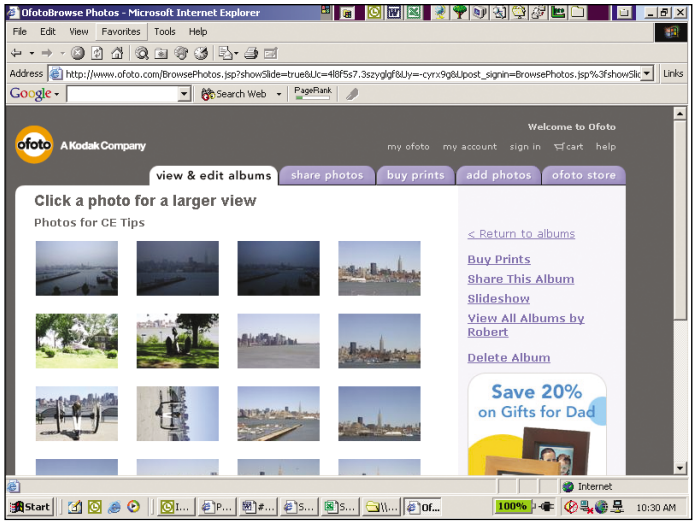
Whichever kind of printer you choose, you are bound to be disappointed by the photo prints it produces if you don't take certain steps in advance, Grotta and other digital photo experts say.

With inkjet printers, the most important first step is selecting the proper paper and inks. The paper works with the ink as a system, says Claudine Wolas, product manager for photo printing at Epson America. Because printer makers sell inks designed to work best with their printers, they also sell papers designed to work best with their inks, Wolas explains. Thus, for the consumer, the best paper to choose is the printer maker's own brand. If you use another third-party brand of paper with your printer, she warns, the photo may emerge from the printer still wet.

Also, combining the wrong paper and ink could result in banding (stripes across the image) or smearing of the image, says Grotta. If you don't buy the printer maker's own brand of paper, she says, check the paper's packaging to make sure it states that your printer and the type of ink you're using are compatible with the paper you use. (Inkjet printers use one of two inks: water-based dye or solvent-based pigment.)

Yet matching the paper, ink, and printer may not be enough to get the best prints from an inkjet printer. If the printer receives the digital photos to print from a PC, it is also essential to tell the computer which type and size of paper is in the printer, for example, whether the paper is 4 x 6 inches or 8.5 x 11 inches and glossy or matte photo stock.

If the paper you use doesn't match the paper



Online photo printers, such as Ofoto.com, can improve the quality of your prints for a small fee.

specified by your printer's manufacturer, Wolas warns, the wrong amount of ink may be used to print the photo, resulting in a poor image quality, or the paper may be fed through the printer misaligned.

Additionally, it is important to maintain an inkjet printer by cleaning the nozzles and realigning the print head on a regular basis. If a printer has been moved a lot, the print head could move out of alignment. The nozzles can get clogged through normal use of the printer, and clogged nozzles cause colors to be lost and may also result in banding, says Serge Timacheff, the lead author of "Total Digital Photography: The Shoot to Print Workflow Handbook," which is expected to be published this October by John Wiley & Sons. Timacheff, who is a professional digital photographer, recommends cleaning the nozzles at least once each week if you're printing between two and five pages per day or haven't used the printer for a long time. A nozzle check, the nozzle cleaning, and the print head alignment are automated functions of the printer. They are controlled through the printer's software.

It is not so challenging to use a dye-sub/thermal dye-transfer printer. These printers work only with specific paper and dye films sold together by the printer maker in a package that contains just enough dye to match the specific number of photo pages provided. Moreover, there are no print heads or nozzles to be maintained. "Dye-sub printers are either overly simplified or refreshingly simple, depending on your perspective," says Mark Weir, senior product manager for digital cameras and digital photo printers at Sony Electronics. Sony sells only dye-sublimation photo printers.

With a Sony dye-sublimation photo printer, there is only one type of paper to buy; there is no choice of glossy or matte. However, in the printer software, the user can choose to have the printer place a glossy or matte final coat on the paper, Weir notes.

There is a potential problem with dye-sublimation photo printer paper, however. If the user gets dust or a fingerprint on the paper before it is fed through the printer, it will show up as an irregularity in the print and will be sealed in the print forever.

Finally, no matter what printer you use, you should consider color calibrating your monitor and your printer. If you don't, the photo you see on your monitor will never match the photo that comes out of the printer.

"Color management is probably the number one reason people are disappointed with their color output," Grotta says. Monitors and printers represent two aspects of the technology of color, she explains; monitors, which are lit from behind, provide transmissive color, while photos provide reflective color, which bounces light off the paper to your eye.

Timacheff declares that "color calibration is very important, and it is not

Send Out For The Perfect Prints

When it comes time to print your digital photos, you have two choices: do it at home or do it away from home.

At Home

The most convenient way to print your digital photos is at home, but you may be compromising on price and quality, says Serge Timacheff, the lead author of "Total Digital Photography: The Shoot to Print Workflow Handbook."

One of the topics he explores in the book is a digital photo's "total cost of printing" (TCOP), which covers the cost of consumables such as paper and ink, as well as the user's time for trial and error.

Generally, more expensive inkjet printers are more economical because they hold individual ink cartridges; you have to buy only one color at a time when its cartridge is depleted.

If a printer maker estimates the cost per print using the device, assume your cost will be 50% higher. The printer maker's test print probably used less ink than your photo, and the test lab didn't waste paper on bad photos.

According to Epson, the cost of a 4- x 6-inch borderless photo printed with its PictureMate inkjet photo printer is 29 cents. The price of a 4- x 6-inch photo printed with Sony's DPP-EX50 PictureStation dye-sublimation photo printer is as low as 57 cents. By comparison, the same photo produced at a retailer or by a Web-based service generally ranges in price from 18 cents to 29 cents.

Away From Home

None of the alternatives to home printing are fast. Web-based services can take days to return your prints to you, while retailers will take at least an hour once you've spent time getting to the store. Often a retailer will take much longer for an 8.5- x 11-inch photo and may even have to send it out to be completed by another supplier.

According to Timacheff, the Web-based services provide very good quality prints and are inexpensive, while the quality of prints from so-called one-hour photo stores are priced comparably to the Web-based services but not necessarily great quality. At retail, digital photos often are printed using the same minilab equipment that is used to print photos from film, and this equipment must be carefully maintained and operated to produce optimal results. Some retailers don't operate or maintain the equipment well. Professional labs make the best-quality prints, but they are expensive.

There are some advantages to using Web-based services or retailers to print your digital photos. They offer bigger prints than you can make with a home printer, and they print on a wider variety of media. In addition, some

Photo by Robert E. Calem

In our experience, images produced from an inkjet printer (above) were significantly better than those produced at a photo lab (below).

Photo by Robert E. Calem

offer professional help to make your photos look better.

For example, Printroom.com prints photos on coffee mugs, mouse pads, T-shirts, and luggage tags—much like other such services do. And, notes CEO Carlton Osborne, Printroom.com offers to have a photo professional fix any photo at a cost of 99 cents per image. The fixes include adjusting the exposure, contrast, brightness, and color.

Ofoto.com offers print sizes up to 20 x 30 inches and a free automated service named Kodak Perfect Touch to fix brightness, contrast, and color.

Many retailers have in-store photo-printing kiosks. But not all kiosks use the same printing technologies. Kiosks made by Sony, in Kinko's stores nationwide, use dye-sub printers. Kiosks made by Kodak, found in CVS, Rite Aid, and Wal-Mart stores, use thermal dye-transfer printers. Kiosks made by Fuji, at Ritz Camera, Rite Aid, Wal-Mart, and Walgreen's stores nationwide, have a thermal autochrome technology, using UV (ultraviolet) light to expose an image on ink-infused paper.

In an attempt to test each of these photo-printing methods, we took a memory card loaded with digital photos to a CVS drug store that offers two kinds of Kodak kiosks—one that ties in to the store's Kodak minilab and another that uses an integrated thermal dye-transfer printer—to have them printed. We also printed the same photos using two digital photo printers by Canon: the i960 Photo Printer (inkjet) and the Compact Photo Printer CP-330 (dye-sublimation). The photos were shot with a 6.3MP (megapixel) Canon EOS Digital Rebel camera. We chose 4- x 6-inch prints for comparison purposes.

To our eyes, the prints produced by the inkjet printer looked the best. In a side-by-side comparison of photos with blue skies, for example, we thought the blues produced by the inkjet printer were more pleasing than the same colors produced by any of the other methods. The inkjet photos also looked the sharpest of those we compared. The quality of the dye-sub/thermal dye-transfer photo prints were our second preference. We didn't like the quality of the minilab prints, which we thought were too dark and off-color. However, the relatively poor quality of these prints may have been due to the vagaries of the particular minilab used by this particular retailer.

Of course, your own photo-printing results may be entirely different than ours—not just by virtue of your equipment, but also according to your taste. ■

to be dismissed summarily." To properly calibrate your monitor to your printer so that the color you see is the color you get, you can use a special device called a colorimeter and calibration software. One such combination that is aimed at home users is ColorPlus ($119), from Pantone ColorVision, an alliance of Pantone and ColorVision (www.pantone.com and www.colorvision.com).

Now Or Later

To avoid the pitfalls of printing photos at home, you may want to offload the job to a retailer (see the "Send Out For The Perfect Prints" sidebar). Besides traditional photo prints, these offer output options that simply aren't available when using a home photo printer, including photos that are larger than 8.5 x 11 inches or are printed on coffee mugs or cookies.

But while it may be easier to print digital photos away from home, it is less convenient. Home printing offers immediacy, whereas using a retailer or Web-based service entails some waiting for the photos to be finished and, perhaps, shipped or mailed to you. Any way you do it, if a digital picture is worth keeping, it is worth printing. CE

BY ROBERT E. CALEM

See In The Dark

How Camcorders Use Night Vision To Create Their Own Light

Birthday parties are fun—but maybe not for the person who is trying to videotape the birthday candles being blown out while they are providing the only light in the room.

A camcorder, like a camera, may yield poor results when it is used in the dark without proper setup. So, for a number of years, consumer-electronics makers have equipped camcorders with the same sort of night-vision technology that has become a staple of TV news reports from nighttime battle scenes.

But like the footage seen on TV, video shot with a camcorder using the standard night-vision technology has a greenish hue.

Sony is building into its latest camcorders a new form of night-vision technology that won't turn everything green—it actually produces color video, even in a poorly-lit room. Called NightShot Plus, this new night-vision technology works in a different manner than other types of night-vision technology.

Seeing Green

The amount of ambient light in a given space is measured in **lux**, which is a unit of illumination defined by the International System of measurement (SI). Lux, the Latin word for light, is related to another term, **foot-candle**, which is a measure of light intensity. Whereas zero lux is total darkness, 1 lux, which is equal to 0.0929 foot-candle, is not much brighter; the ambient light in a normally lit office is equal to about 70 foot-candles.

When Sony introduced its first night-vision technology for camcorders, called NightShot, in 1998, it could see in a zero-lux environment to a maximum distance of 10 feet. An improved technology, called Super NightShot, which was introduced in 2000, could see in a zero-lux environment to a maximum distance of 20 feet.

Ordinarily, inside a camcorder there is an IR (infrared) filter in front of a CCD (charge-coupled device) filter, and light passes through both in the video-recording process. When the user flips a switch on the camcorder to activate the usual type of night-vision technology, the IR filter is moved out of position, explains Kevin Brinkman, product information manager for camcorders at Sony Electronics. Next, while recording, the camcorder emits an IR beam of light in its focal area. When the subject reflects the IR beam back at the camera, the subject in effect is illuminated for the camcorder to see and record. The resulting video is monochrome, like black-and-white television. Darker colors are seen as a darker shade, and lighter colors are seen as a lighter shade. The process is completed in less than one second, Brinkman says.

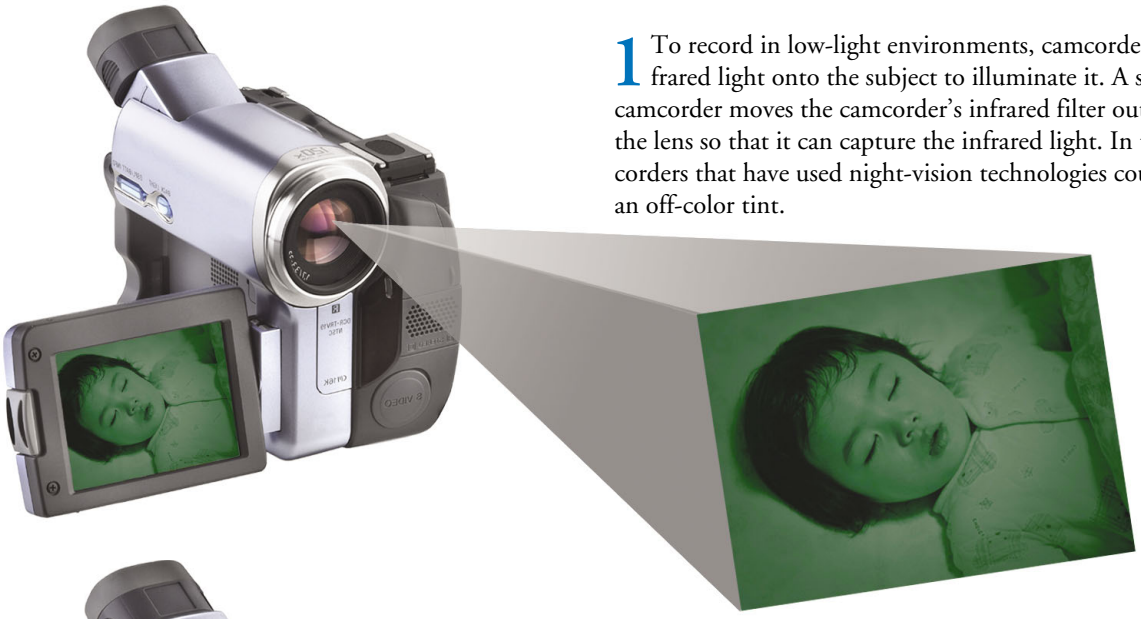
Adding Color

Sony's NightShot Plus adds color to night-vision video by using a mathematical algorithm to calculate color. It won't record color in a zero-lux environment, but NightShot Plus video shot in darkness will be "less greenish" and clearer than video shot with earlier NightShot technologies.

Some higher-end Sony camcorders offer a better version of the new technology named Super NightShot Plus (available in the MiniDV Handycam Camcorder DCR-HC85, among others) that works with a slow shutter mode. In this mode, the camcorder's shutter speed is slowed automatically to between 1/4 and 1/15 seconds, letting more IR light enter the lens. The result is higher contrast and image quality, and even better color representation in low-light environments, according to Sony.

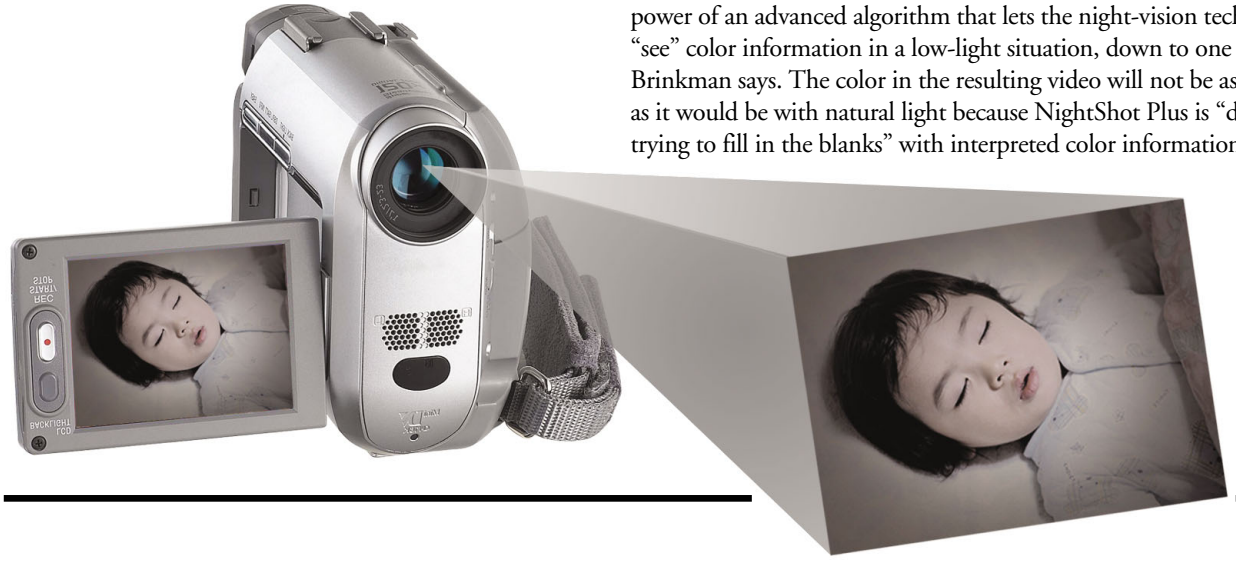
According to Sony, NightShot Plus works only up to 10 feet away from the subject, not the 20-feet distance enabled by Super NightShot or Super NightShot Plus. CE

BY ROBERT E. CALEM



1 To record in low-light environments, camcorders beam an infrared light onto the subject to illuminate it. A switch in the camcorder moves the camcorder's infrared filter out of the way of the lens so that it can capture the infrared light. In the past, camcorders that have used night-vision technologies could give images an off-color tint.

2 Sony's NightShot technique, which also used infrared light and moved an infrared filter away from the lens, improved night-vision technology. It could capture monochromatic images and illuminate a subject in a 0-lux environment.



3 NightShot Plus: NightShot Plus (found in some Sony camcorders such as MiniDV Handycam Camcorder DCR-HC20) adds the power of an advanced algorithm that lets the night-vision technology "see" color information in a low-light situation, down to one lux, Brinkman says. The color in the resulting video will not be as intense as it would be with natural light because NightShot Plus is "digitally trying to fill in the blanks" with interpreted color information.

Offload At eBay™

Clear Your Shelves & Make A Few Bucks

Hands up, all those with electronics equipment you no longer use even though it works just fine. That old turntable that took you through the '70s and '80s, those video game consoles you spent countless hours attached to, that dual auto-reverse tape deck you no longer even have a stereo for, that electric guitar that would have made you a star if you just hadn't had those kids. Guess what? Somebody wants them. Put them up on eBay, and chances are very good they'll wind up in a happy new home.

Wait a minute, you're probably saying. This stuff sells? Yes, it does. Go to eBay (www.ebay.com) and do a search for some of even the most obscure goods you've bought in the past, and you'll get an idea of how consumer cultures work. If you bought something and enjoyed it (or even if you didn't enjoy it), other people bought it, as well. And others heard of it and thought they wanted it but didn't or couldn't buy it for whatever reasons. Years later, it's valuable to them, even if you think it's only junk. Junk, after all, is in the eye of the beholder.

What eBay gives you is a market of gazillions of people willing to pay for used products—new products, as well, but the real fascination (and the point of this article) lies with used. Let's take a look at how to get your product up for sale, taking best advantage of eBay's features to help you present it to your strongest possible advantage. The device gets a new home, and you get some free space on your shelf—oh, and a few bucks, too.

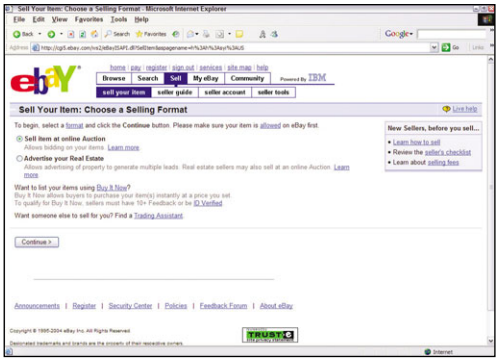
For the sake of this demonstration, we'll look at selling an old video game console and an old record turntable. Both categories make frequent appearances on eBay, and both are in demand. In the case of video game consoles, nostalgia is probably the driving force; for turntables, a great many old albums sound quite a bit better in their old vinyl format than on CD, despite everything the music industry has been telling us. And besides, not every valuable piece of music has made the transition.

Prepare For The Sale

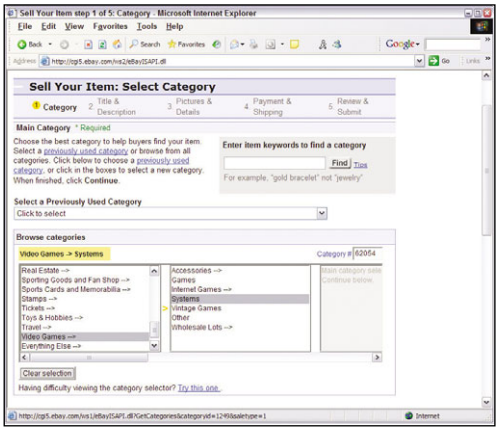
You need to perform a few preparatory steps before actually putting your electronic goodies up for sale. First, you need some photographs. Or at least, you *should* have photographs. You can put anything you want for sale on eBay without photographs, but in the case of online selling, a picture really is worth a thousand words, and more than one picture can tell an entire story.

Get out your digital camera and take a photograph of the product from several angles: from the top, from the back, from the sides, and from straight in front. In the case of the video game console, take a separate picture of the controllers, any add-ons you'll be including, and even the cables that come with it. If you have the original box, photograph it, as well. And with all electronic equipment, take a picture of the connectors; any potential buyers knowing the variety of connections available for old equipment will want to see if they can make use of the device when they get it into their houses.

Next, use a word processor to write a full description of the product. Sell it, but don't hide any flaws it might have. People know it's used, and they'll expect signs of usage: scratches, dents, smudges, perhaps a missing label, or a slight crack in the plastic cover. Use the term "mint" (a drastically overused term on eBay) only if it truly is in perfect shape; telling people the item is "certainly well used, but in very fine shape nevertheless" gives your customers a sense that you can be trusted (just make sure it's right). Don't be afraid to cast potential negatives into honest positives: This Sega Genesis gave me thousands of hours of enjoyment when I should have been studying for my college exams, and even though it shows a few well-earned scars, it'll still give you the best Sonic the Hedgehog you'll ever see.



Begin the process of placing your item on eBay.

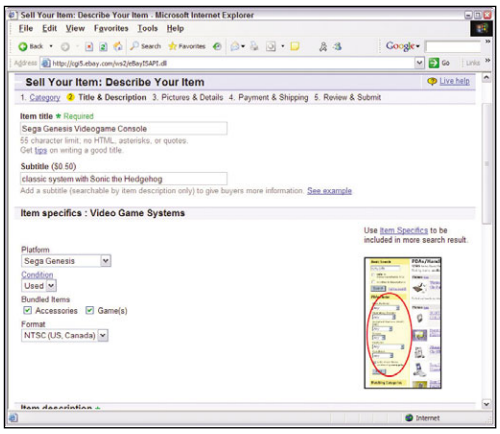


Here you begin the crucial task of choosing a category.

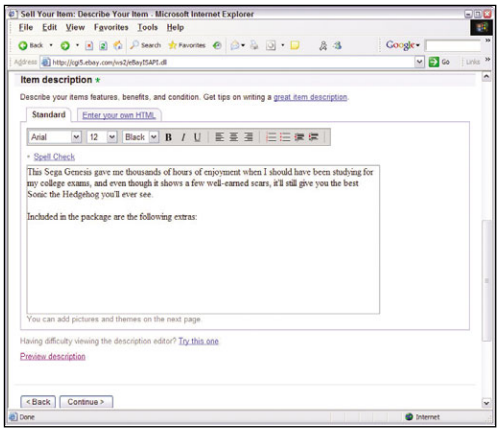
Translation: It has a few bumps and bruises, but, otherwise, it runs its games perfectly well.

In addition to an introductory blurb, type in a list of all the components;

everything, in fact, and include connectors, wires, instruction booklets, original marketing materials—whatever your buyer will receive, along with a short statement of the condition of each one. To a collector, that feedback card you never sent in might be a selling point if it's in tip-top shape. You never know, and you should never assume.



Describe the item you wish to sell with as much accuracy and clarity as possible.



You'll see this screen (pictured above) when you're ready to put in the main part of your description.

Finally, determine where you are willing to ship your goods and how you will accept payment for them. Many eBay sellers and buyers use PayPal (www.paypal.com), a system that, in effect, inserts a reasonably safe buffer into an online credit card transaction and, in the process, saves you from having to set up a merchant account with a credit card company. But you can also accept money orders, personal checks, direct credit card transactions, and pretty well anything else you specify. If you decide on PayPal, you'll need to set up a PayPal account before you start. If you decide to accept money orders or checks, contact your bank beforehand to determine what kind of each it will process. For example, many U.S. banks will not accept checks in U.S. dollars drawn on Canadian or European banks, and some institutions accept only money orders specifically designed as internationally valid.

As for shipping destinations, the only real question is whether or not you want to put up with the extra paperwork often necessary when shipping outside your home country. If not, say so up front, but also realize that eBay attracts a global audience, so you might be cutting into your potential sale.

Click To Sell

To start the process of putting your goods up on eBay, open the eBay home page and click the Sell link at the top of the page. If for any reason the Sell link isn't there (eBay changes its home page fairly often), you should see a similar link close by. Once you click the link, you must sign in to your eBay account. If you don't have an account, take a few minutes and create one, and then log in and click the Sell link again.

Basically, placing your item on eBay means stepping through a fairly lengthy wizard. The first page of the wizard lets you choose between selling an item at an auction and advertising real estate, so select the first and click Continue. The Format link at the top of the opening page shows you the different ways of selling goods, including establishing an eBay store, but for now just go with the default, which is a standard auction sale.

The resulting screen starts the listing process. At the top, you'll notice the steps you need to complete. We'll step you through listing an item as you'll see it on your screen.

Step One: Select Category

The eBay wizard places the category choice right in the beginning, and that should tell you of this step's importance. In all likelihood, in fact, this might well be the most important step of all, for the simple reason that eBay customers browse for products as much as they search for products. Not in the same way, of course. Often a shopping expedition starts with a search, but returnees to eBay frequently have their favorite browsing topics bookmarked, and they call them up to see what's new.

This page, especially the category applet at the bottom, takes awhile to load. Once in place, scroll through the leftmost category listing to locate the main category, click it, and, in the middle listing, choose the subcategory. Some categories have two and even three subcategories; be sure to choose the one closest to what describes your product. In our case, the category for the Sega Genesis video game console is Video Games, Systems, while the Dual turntable falls under Consumer Electronics, Home Audio, Turntables, Turntables, and Other.

Scrolling down below the Category applet reveals a second Category applet. Sometimes you can increase hits from people browsing eBay by listing your item in two categories rather than just one. Our two examples don't stand to gain much additional exposure by forcing them into a second category, but many products do. If you have old board games to sell, for example, you'll often find they fit two categories easily. The same holds true of books, which you can list in the Books category, as well as in the category corresponding to the subject of the book. Using two categories doubles the insertion fee (which we'll come to in a bit), but it can most certainly increase exposure. To get an idea of how multiple categories work, spend some time browsing eBay to learn how other vendors have used this feature, especially for products similar to yours.

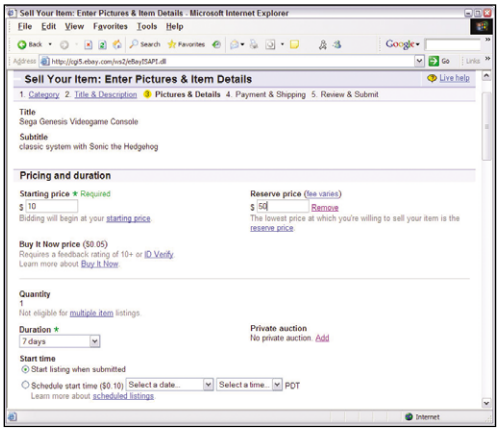
With your category (or categories) in place, click Continue to move on.

Step Two: Describe Your Item

On the Describe Your Item page, you get the opportunity to distinguish your item from everyone else selling the same thing on eBay. Give your product a title (usually just say what it is: Sega Genesis Video Game Console, for example) and a subtitle, which provides potential buyers with more search info. Note the parenthetical information next to the Subtitle category, letting you know filling out this field costs you 50 cents more. Because the category is Video Game Systems, you'll need to enter platform-specific selections. The subtitle does not appear with a basic search, but it accompanies the main title, thereby providing some additional detail. For low-price items, obviously it's not necessary; for both of ours, however, any little bit helps, and it's half a buck well spent.

To provide the lengthy, free-form write up, scroll down the page to the Item Description area. There you'll find a large text field; be sure to note the formatting bar on the top and the Spell Check link just above the field. Always, always use the spellchecker. One of the ways potential buyers gauge the credibility of the seller is by his written product description. Why risk alienating potential buyers with typos and grammatical errors? If you prepared your document in Word and spell checked it there, you probably don't need this feature, nor will you need some of the formatting options. Remember, you can enter HTML directly by clicking the Enter Your Own HTML link. This feature is useful for bolding or italicizing keywords or providing a link to a Web site you might have created that offers additional photos or even videos of the product (sometimes a very good idea but obviously time-consuming).

To see what your description looks like, click the Preview Description link at the bottom of the page and keep checking it until you have it right. Once your product is up on eBay, the first bid will freeze the description in place. You can add additional passages of description, but you can no longer change the initial submission. So check it until you can't stand reading it any more to ensure you've made no errors or misstatements.



You need to set the Starting and Reserve Prices.

Step Three: Enter Pictures & Item Details

After clicking Continue, you come to a long page in which you pretty well finalize what eBay visitors will see. You'll see the Pricing and Duration section, and this is where you can enter the Starting Price (many items start at $1) and the Reserve Price. The Reserve Price is the price below which you will not sell the item; if you don't use it, you are obligated to sell the item to the highest bidder, even if the highest bid comes in at the Starting Price. The downside of a Reserve Price is that it costs you a few extra dollars; you can determine the exact amount by clicking the Fee Varies link beside the Reserve Price heading. See the Fees heading below for a list of what each component costs.

The Duration selection—a pull-down menu with choices for three, five, seven, or 10 days—can matter. Most bids occur early in the listing and toward the end, so a 10-day listing can seem to drag on. On the other hand, the listing will be seen by the most potential buyers, and many will bookmark it (by adding it to their Watch lists), seeing it every time

The Cost Of Doing Business

Obviously, eBay isn't a free marketplace. If you use its services, you have to pay for it. The question is: How much? Here we look at a typical sale of a used game console with two games included, being sold as a single unit. For the sake of the example, we'll use the following (fairly typical) prices: Starting Price: $1, Reserve Price: $50, and Selling Price: $165. Let's also assume that the seller chose the full Picture Pack, listed the item in two categories (shown as x 2 in the chart), chose a Bolded listing, and chose a 10-day auction.

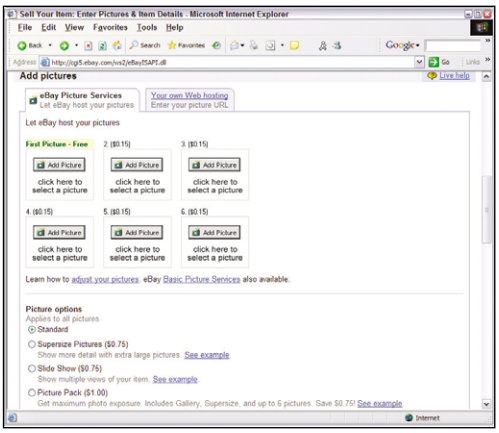
Name	eBay Charges	eBay's Take	Your Net
Insertion Fee (based on Reserve Price)	Flat	$1.20 x 2 = $2.40	
Reserve Price Auction Fee (refunded if item sells)	Flat	$1 x 2 = $2	
eBay Service Fee (pictures, slideshow, supersize images, picture pack options)	Flat	$1 x 2 = $2	
10-Day Duration	Flat	20 cents x 2 = 40 cents	
Bold Listing	Flat	$1 x 2 = $2	
Final Value Fee	5.25% of first $25 2.75% of remainder	$1.31 + $3.85 = $5.16 $165 - $13.96	
Totals		**$13.96**	**$151.04**

they visit eBay and open their My eBay page. Short durations can be useful if you know an auction has just ended that had numerous bids throughout, and you want to try to get those same people competing for your items, with a quick turnaround. Of course, three-day auctions can also help if you need the money quickly.

Next comes the area in which you can truly make your listing stand out: pictures. With your digital pictures conveniently stored on your hard drive, click the Add Picture button, browse for the graphic file, and upload it. Posting one picture is free, and each additional photo costs 15 cents. eBay offers a useful set of special photo deals listed below the selection area. For each of these products, the most economical are the Slide Show (75 cents) and the Picture Pack ($1). The Slide Show lets shoppers step through a series of slides, and the Picture Pack lets you upload six photos in a gallery, including a Supersize option for each picture. A Supersize picture is simply a larger version of the photo, ideal for showing the kind of detail electronics buyers want to see.

If you choose a picture package along with the multiple category option, however, you'll be charged the price of the package for each category. In fact, with your item in two categories, every fee doubles. That's not exactly clear until you get to the end.

At the bottom of this window, you'll find a number of options under the heading Increase Your Item's Visibility. For 25 cents, you can add a photo of the item to the general listing and the search results. For $19.95, you can showcase your product as a featured picture gallery. For $1, your item appears bolded in the Browse and Search listings. For $5, a colored band highlights your listing. If you really want visibility, cough up $39.95 to get the product shown on eBay's home page. Unfortunately, these items rotate regularly, so you have no guarantee anyone visiting eBay will actually see yours. But if you have something unique, it can be well worth the additional cost.



You'll want to add photos to your listing. The more photos, the better. Buyers want to be able to get an idea of what the product looks like before buying it.

Step 4: Enter Payment & Shipping

The last step is to enter payment and shipping information. You can choose to accept payment by PayPal, money order, cashier's check, personal check, COD, and more. You can also set up your own merchant account in order to accept credit cards directly. You have a variety of options for shipping prices and types, but in most cases the easiest option is to have the buyers contact you and specify how they want the items shipped.

During & After The Auction

Once your auction is underway, you can't do much except wait. Until the first bid is placed, you can change the text and pictures associated with your sale, but after someone bids on your auction, you can only add notes to the page (click the Sell link and follow the instruction on your item listing). But make no mistake: These notes can be useful. If you discover something about your product isn't quite the way you described it, give your potential buyers an update. Sometimes you'll get email from an eBay user asking for additional details, so why not post them for everyone to see? Some sellers even post humorous messages they've received from eBay shoppers, a great idea to give the sense that your item is a hot topic.

In fact, communication with buyers is typically part of the eBay system; if the buyer is a first-timer (click his username to see his eBay history), explain what to do from that point on. eBay lets you create an invoice that automatically gets sent to the buyer, and another service lets you create shipping labels (at additional cost). Mostly, though, the final steps require that you ship the product in a good box with good protective material, to the right address, and within an acceptable time. Of course, you do so only once you've received the payment, but the vast majority of people buying on eBay realize that perfectly well.

BY NEIL RANDALL

Timing Counts

People bid for the products you list on eBay, and the system relies solely on supply and demand. Research and browse in the days and weeks before you post your product to determine the best time to list your goods. If you discover eight dual turntables similar to yours available at the same time, there's not much point listing yours unless you have something unique to offer along with it. Wait until the glut clears and see how quickly the stock replenishes. You might find a period of eight to 10 days with only one or two (or no) turntables listed. Watch for patterns and strike when you have the best chance of having the site to yourself. If you have to share the spotlight with similar products, do everything you can to make your listing stand out, using both eBay services and your own email skills.

Pushing The Envelope

Everything You Ever Wanted To Know About Push-To-Talk Phones

Sometimes you need to throw the occasional "niner" or "ten-four" into a conversation. At times like these, or when always-on instant voice communication is in order, there's PTT (Push-To-Talk). Also known as P2T or walkie-talkie-phone service, PTT facilitates faster, cheaper, and more direct wireless conversations, but it isn't perfect. **Latency** (lags in initiation or communication times) and etiquette quandaries are two of the issues facing early adopters. In any case, PTT service represents a growing trend in the universe of wireless options, and it's coming in loud and clear.

Walkie-Talkie-Phone Technology

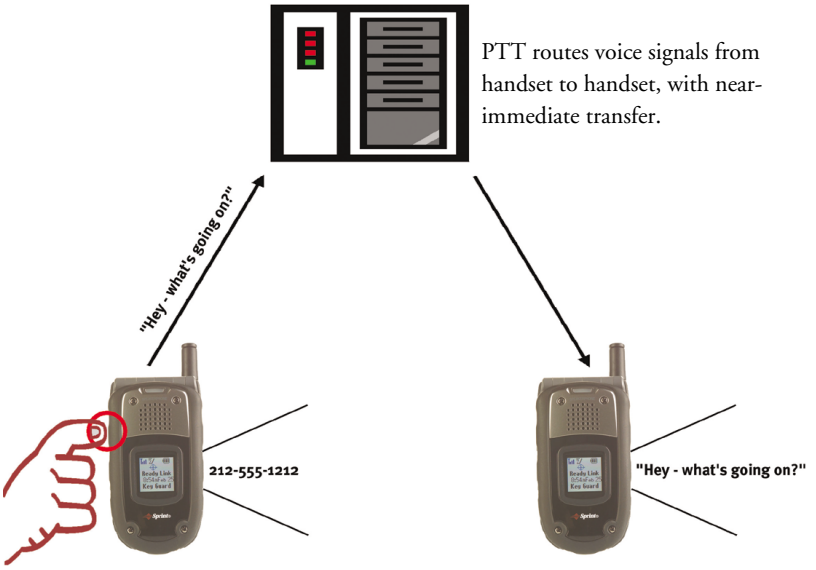
For all the recent hype, PTT is nothing new. Nextel has been offering the service in select local areas for about a decade and currently has more than 13 million subscribers. It's not even particularly exotic technology. Like all wireless service, PTT is based on radio transmissions, and various implementations make use of SMR (Specialized Mobile Radio; similar to real walkie-talkies) or VoIP (Voice over IP) technology. Though PTT established itself long ago in industrial and logistics circles, the technology has received new attention as a result of increased personal and commercial interest.

Technology success attracts competition like little else. Though Nextel is the old pro, at least three other providers (Verizon, Sprint, and Alltel) have introduced their own PTT offerings in the last year, and a number of other wireless players promise to join the fray. Even software developers are getting into the act: Check out our "Soft PTT" sidebar for a fascinating alternative compatible with almost any wireless system.

Before delving into the various options, you should be familiar with a few characteristics shared by all PTT technologies. The first is duplexing. PTT is **half-duplex** (also called **simplex**), meaning that only one person can talk at a time. **Full duplex** technologies (such as phones) allow more in-depth and interactive conversations, but half-duplex communications are usually quicker and require less dedicated attention on the part of each user. In half-duplex communications, a new speaker can't begin (press the button and start talking) until the previous speaker finishes (lets go of the button). PTT also lets you communicate in one-to-one or one-to-many broadcasts (group calling). Choose a contact number or a group from your handset's address book, and the PTT system handles the rest. In a group broadcast, an identical copy of the sender's signal is sent to each recipient. All you need to do is define the group's members in advance, usually through a PC interface but sometimes from the handset's menu itself.

Also, PTT services are proprietary to each carrier. For now, you can't have a walkie-talkie conversation between your Nextel service and your roommate's Sprint phone. Some incompatibility is a result of technical logistics; more of it is due to competitive market forces. Finally, PTT is intrusive. By definition, instant and always-on communication means that your voice or a notification beep will emerge uninvited from your buddies' pockets (if they're receiving PTT transmissions). Be careful how you use that license. Despite these similarities, however, there are important technology differences between PTT implementations. Understanding them will help you recognize the relevant features and benefits of each.

Nextel's traditional Direct Connect technology was the most simple to implement because the underlying network was based on existing analog radio dispatch frequencies and technology. Nextel built its network on iDEN (Integrated Digital Enhanced Network) technology, developed by Motorola. iDEN uses cellular networks to conduct standard two-way radio transactions. In some ways, PTT is a more natural use of iDEN than standard voice traffic and, thus, Direct Connect was more or less a native part of the system from the beginning. The embedded nature of PTT explains why Nextel has an edge over its competitors in



PTT routes voice signals from handset to handset, with near-immediate transfer.

latency and cost; requests are connected more quickly and there's less need for costly system expansion. Though iDEN is an 800MHz version of TDMA (Time Division Multiple Access) technology, the same underlying standard for worldwide GSM (Global System For Mobile Communications) networks, it's incompatible with other systems.

Competing providers didn't have the luxury of networks with integrated PTT functionality, so they figured out a way to add walkie-talkie features to their existing voice and data networks. The result, often called PoC (Push-to-talk over Cellular), is based on VoIP. Essentially, the sending handset converts analog audio to digital bits and transfers them across the network as data, using the phone systems' data networks (rather than creating a dedicated-channel voice call). A central server transfers the data to the receiving handset, which decodes the signal as audio. The process is conceptually similar to instant messaging. However, the necessity of converting the signals and navigating busy networks often creates lags. Some early users report 10-second or longer delays beginning PTT conversations, which more or less defeats the purpose of "instant" communication. And, if the data network is performing poorly (as a result of equipment problems or surges in the amount of network traffic), service may be spotty. In some cases, the network may simply be unavailable, leaving you unable to connect at all.

PTT & You

Knowing a little about PTT technology is great, but it probably doesn't answer your most fundamental concerns: What does it mean to me? We'll address seven common questions, which should help you see how PTT fits in your world.

- **Who offers service?** Nextel, Verizon, Sprint, and Alltel currently have PTT services. They're called Direct Connect, Push to Talk, Ready Link, and Touch-2Talk, respectively. You also need a compatible handset (Motorola, Sanyo, and Kyocera make several models) and activated service. Nextel PTT users have a separate number for Direct Connect; the other providers just find you with your normal wireless number.
- **How do I use the service?** The process itself is simple. Look up a number or group in your address book. Press the PTT button. Speak your piece (unless you're sending a call alert first) and wait for a response. Repeat, taking turns pressing the button and talking, until the conversation is over. You can create groups through PC software that sync with your handset or from its address book options.
- **What are the costs?** Obviously, service plans and options vary by provider. But, in general, plan on paying a monthly fee to carry the option, and your PTT minutes may be unlimited or separated from voice minutes. Nextel customers get unlimited local Direct Connect use with almost any plan, though per-minute limits and overage rates apply for Nationwide and International Direct Connect. Verizon offers unlimited Push to Talk minutes for an extra $20 a month. Sprint doesn't charge ReadyLink minutes

Button, Button

Our mobile phone cases are already crammed with buttons and controls. Phones, color screens, keypads, volume controls, and memory card slots eat up tons of space on your phone's case. Now you want to add another button—for PTT (Push-To-Talk)? Before we get carried away, fast mobile (www.fastmobile.com) has other ideas.

The company's application, called fastchat, promises full PTT, multi-format messaging, and even PC-to-Mobile messaging. The technology is for both service providers and consumers, but it currently supports only a handful of phone models (running Symbian OS variations). It's been through some trial runs in the United States and United Kingdom, with prices around $10 a month for unlimited messaging. The program works by delivering software buttons and options, and replicating PTT VoIP (Voice over IP) functionality through wireless data networks. It works with any GSM/GPRS (Global System For Mobile Communications/General Packet Radio Service) network worldwide (you'll need to subscribe to your service provider's data plan), essentially making walkie-talkie service available around the globe. Group calling, voice mail, IM, and email round out the mix.

The software bridges traditional PTT limitations of interoperability and infrastructure, while providing the same features. If you have the right handset, it's definitely an option worth exploring. ■

Other carriers and manufacturers (such as Sprint and Sanyo) have adapted VoIP technology to offer PTT.

against voice minutes, and packages range from $10 to $20 a month. Alltel charges around $5, $10, or $20 for 100, 500, or unlimited Touch2Talk private call minutes.

- **What happens on the other end?** Depending on how you place a PTT request, the recipient will hear a call alert tone or your initial speech. If the recipient's phone isn't on or is unavailable (off or out of the service area) nothing happens on the other end, and you can't transmit, unless you have instant voice mail service. Recipients with silent alert features may hear a buzz or quick chirp to let them know you're calling. Either way, once the recipient acknowledges your transmission with a reply, the conversation is underway.
- **How can I use the technology?** People find myriad uses for PTT technology. In a study by PARC (Palo Alto Research Center), researchers found a group of young tech-savvy users who supplemented other forms of communication (phone calls, IM, face-to-face interactions) with PTT while developing a unique style of using the new technology. The most common uses include brief exchanges of plans and information ("Meet me at the bar at 5:00"), bursty, running dialogue (spurts of conversation separated by long periods of inactivity), and group conferencing (gathering physically present people together—same place, same time—or PTT participants for ad hoc meetings). You can also use PTT in any situation where a long-range walkie-talkie would be useful.
- **Can I avoid requests?** PTT is just like any other phone or IM service. If you don't answer, the caller doesn't know if you're around or not. You can always turn off your phone or disable PTT or leave it on and screen calls. Many models and service providers offer silent alert options that will buzz or beep when you have an incoming request, rather than letting the caller broadcast from your speakerphone at any time with no warning. You should also control who has your number. Nextel makes this easy; Direct Connect uses numbers different from regular voice service, so you can separate who knows which number.
- **What about PTT-iquette?** Just as we developed a set of conventions and etiquette guidelines for wireless phone usage, we'll figure out PTT-iquette as the technology becomes more common. Privacy is one concern; you don't know who's listening to your comments on the other end, especially if the recipient isn't using a headset, so be careful what you say. Similarly, you don't know who's around or what's going on when you place a request, so avoid embarrassing the recipient. Begin with a polite introduction and a request for conversation. As with wireless calls, avoid PTT while driving or where it may disturb others, such as at restaurants, movies, live performances, church services, etc.

PTT Into The Future

There are a few developments poised to help drive PTT's growth. Voice mail options are emerging in several plans, so you can leave an instant voice message with a recipient who isn't available. In other words, imagine an audio version of SMS (Short Message Service). Some insiders are also talking about soft buttons,

Nextel's iDEN network is the granddaddy of PTT technology. Nextel's Direct Connect service provides immediate access from handheld to handheld.

in which a software interface mimics the walkie-talkie's physical buttons on-screen. The possibilities are enticing. There'll be fewer hardware demands, greater customizability, and the opportunity to program multiple actions into the button (text macros and hand raising in a group environment, for instance). However, interoperability is the holy grail of PTT. Until users from one network can talk to users on another, the technology's potential will be limited to corporate purchasing plans and friends-and-family who use the same service provider. Because the non-Nextel services all use VoIP technology, sharing is possible with a standards-based infrastructure. Crossing over to iDEN will be trickier (especially with the differences in latency), but anything's possible with enough market potential. Even farther out is PTV: Push to Video. As phone-based digital still cameras become digital video cameras, and as bandwidth capacities continue to increase, we'll eventually arrive at a time where instant mobile videoconferences are possible.

Until that time, we'll be working on PTT. New carriers and manufacturers are coming on board all the time, and we'll discover new and even better uses for the technology as adoption grows. CE

BY GREGORY ANDERSON

Introducing the AMD Athlon™ 64 FX processor. Take your system to extremes.
Double the data path from 32- to 64-bit and you more than double the thrill factor. Uninterrupted, ear-splitting, streaming audio and rich, razor sharp video make your pad a launching pad. What's more, you get all the power you need to edit, mix, and model your own digital creations with memory to spare. Prepare to blow minds. Get a dose of the AMD Athlon 64 FX edge at www.amd.com/amdathlon64fx

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Internet Anywhere

Build Your Own Wireless Network

Ready for the freedom of a wireless home network? With so many network-ready devices hitting the market, including home theater equipment, stringing all the Ethernet cable necessary to connect them to a traditional router is an expensive chore with unsightly results unless you route those wires through your walls. Wireless networks come with higher upfront costs for equipment, but the ability to instantly connect every network-ready device in a home to one another and the Internet is a convenience all computer and A/V enthusiasts should investigate.

Before You Begin: Basic Equipment

You don't need Internet access to set up a home network, but the following examples assume that you have either a cable or DSL broadband Internet connection. As for hardware, at bare minimum you'll need a wireless router, as it serves as the core of the wireless network. All network devices connect to it one way or another, and all network traffic passes through it. Wireless routers come in three configurations: 802.11b (Wi-Fi), 802.11g, and 802.11a. We recommend purchasing an 802.11g network router, as it offers higher data transfer rates than 802.11b yet is backward-compatible with 802.11b if you want to mix and match hardware. 802.11a technology is also fast but is expensive, has range issues, and is not backward-compatible with popular 802.11b equipment.

Each computer needs a wireless NIC (network interface card), using either 802.11b (cheap and slow) or 802.11g (expensive but fast) technology. An alternative we recommend is connecting at least one desktop PC to the router using a CAT-5 Ethernet cable, for reasons that will be explained shortly. If the computer that is to be connected via the Ethernet cable does not have an integrated Ethernet port, you can purchase a cheap 10/100 Base-T NIC. These are available in versions that are installed in empty PCI (Peripheral Component Interconnect) slots in the PC's case or via USB ports.

The heart of any wireless network is the wireless router, which handles all network traffic.

Stick with products from the same manufacturer when purchasing network hardware. This is especially true for wireless products, as many manufacturers incorporate proprietary speed-enhancing technology into their products. You can't take advantage of the higher data transfer rates if you mix components from multiple manufacturers in your wireless network. Using products from a single manufacturer also makes it easier for technical support representatives to troubleshoot problems.

Phase 1: Download Drivers & Firmware

Before performing any of the steps outlined in this article, it is important to download the latest drivers and firmware for your wireless hardware. **Drivers** are software that let the equipment communicate with the computer, and you must download drivers that are compatible with the operating system used by the computer where the hardware is to be installed.

Firmware is software used internally by hardware to process data. It generally is stored on special flash memory chips within the hardware device, and the process of updating the firmware is called **flashing**. Flash memory chips are designed

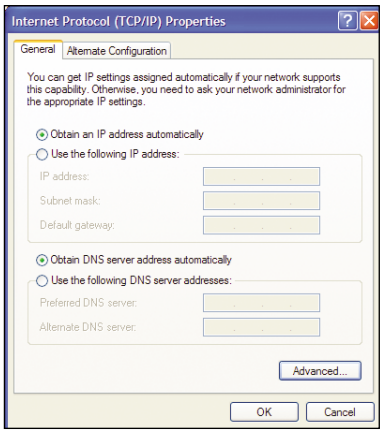
to retain the data even when there is no power to the device, and updating to the latest firmware revision can add new features and functions to a device or simply let it operate more efficiently.

Never install firmware unless you know with absolute certainty that it is compatible with your hardware. Firmware that is not compatible or that is improperly installed can render the hardware useless, and typically the only way to fix botched flashing jobs is to send the device back to the manufacturer for expensive repairs. The main problem with firmware is that wireless network hardware manufacturers have a tendency to release products that have the same model number but that come in several versions (typically called **revisions**). The D-Link 802.11g DI-624 router discussed later in this article is a perfect example, as it has a model number of DI-624 but comes in three revisions (Rev. A, Rev. B, and Rev. C), all with different firmware. Check the manufacturer's Web site and the serial number on your router carefully to make sure everything matches up. Most manufacturers recommend that wireless connections should be avoided when updating a router's firmware, hence our earlier recommendation of connecting at least one PC to the router using an Ethernet cable.

Phase 2: Install The Wired NIC

If the PC that you connect to the router does not have an integrated Ethernet port, install the PCI or USB NIC according to the instructions included with the product. This generally involves installing the drivers first (use the most recent downloaded drivers for best results) and then installing the hardware. To install a PCI card, you'll need to shut down the PC and open the case to access an empty PCI slot. Installing a USB NIC involves little more than plugging the device into an available USB 1.1 or USB 2.0 port on your PC.

Depending on the router you plan to use and the requirements of your ISP (Internet service provider), you may have to establish the IP (Internet Protocol) address and DNS (Domain Name System) server settings for the NIC. To access these settings in Windows XP, click Start, click My Network Places, click View Network Connections, right-click the icon that corresponds to the NIC, and click Properties. Find the Internet Protocol (TCP/IP) entry in the This Connection Uses The Following Items box, click it to highlight it, and click Properties. Use the radio buttons in the General tab to establish the settings according to the documentation that came with the router or the instructions provided by your ISP.



Configuring the NIC to obtain an IP address properly is an important step in the creation of a wireless network.

In Windows 98 and Windows Me, click Start, expand Settings, click Control Panel, click View All Control Panel Options (if it's available), and double-click Network. Click TCP/IP to highlight it, click Properties, and use the tabs to access and enter the recommended settings. In most circumstances the only changes you'll have to make are choosing the Disable DNS radio button on the DNS Configuration tab and selecting the Obtain IP Address Automatically radio button on the IP Address tab.

Phase 3: Install The Router

There is no wireless network without a router, so installing and configuring that component is important. Sharing a broadband Internet connection via the router requires a wired connection from the router to the cable or DSL modem, so it generally is best to locate the router in the same room as your cable or DSL modem. Instead of connecting the output cable from a cable or DSL modem to a PC, use a CAT-5 Ethernet cable to attach it directly to the router, plugging the cable into the router's Internet/WAN (wide-area network) port. This configuration lets any computer on the network access the Internet connection without the need to turn on any particular PC to establish the initial connection to the Internet.

As recommended earlier, attach the wireless router to a desktop PC using an Ethernet cable for the initial configuration. Nearly all modern wireless routers come with several Ethernet ports for making these wired connections, and they generally are numbered. It doesn't matter at all which numbered port you use for the connection to the PC. Just attach one end of a CAT-5 Ethernet cable to a numbered router port and attach the other end to the PC's Ethernet port.

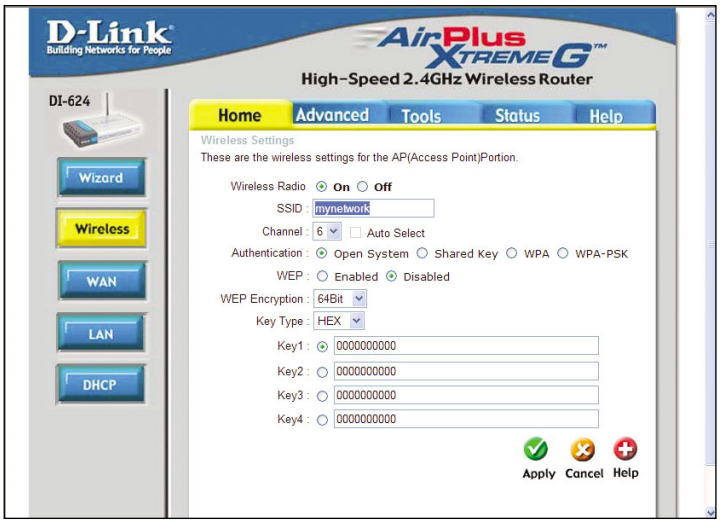
Plug in the router's power supply, preferably into a power strip with surge suppression capabilities. The router provides a path for electrical spikes to penetrate any attached computers or other equipment, so surge suppression is a must. Once you plug in the power supply, plug the other end in to the router and wait for it to go through its self-test procedure. This usually takes only a few seconds, and most routers are festooned with LEDs (light-emitting diodes) that give users constant feedback about the router's status. Check the documentation that came with the router to find out what each light or blinking light pattern means.

Phase 4: Update & Secure The Router

You can adjust router settings usually using a browser-based interface. The instructions here apply to a D-Link 802.11g DI-624 wireless router, but other routers should follow similar configuration procedures.

Check the manual that came with the router to see what IP address you need

to type into your Web browser to access the hardware. If you can't find it, enter **192.168.0.1** into the Address bar of your Web browser (don't worry about typing "http://" or "www"). When the login box pops up, enter the information found in your instruction manual to log in and access the router's settings. If you can't find this information, don't worry; most routers have default login settings that are easy to find using a simple Web search. For example, if you have a Linksys or D-Link router, try typing **admin** in both the Login and Password fields. For Netgear products, type **admin** in the Login field and **password** in the Password field. If none of that works, try entering **admin** in the Login field and leave the Password field blank.



The SSID is the name of your wireless network, and all wireless NICs must know it or they won't be able to connect.

The Web-based interfaces vary in layout, but most contain the same basic options. Install the updated firmware you've already downloaded or look for a tab related to firmware to update the router. With the DI-624, click Tools, click Firmware, and click the Click Here To Check For An Upgrade On Our Support Site link or click Browse to select a previously downloaded firmware file. Follow the prompts to download and install the software and follow any provided instructions carefully to avoid damaging the router. Remember to perform the installation only from a PC that is physically connected to the router using an Ethernet cable. You may notice that new tabs and options appear after the newest firmware is installed.

Now that you've updated the router, change the login password and enable encryption to make it harder for unauthorized users to access your wireless network. Wireless transmissions use radio frequencies that penetrate through walls and other obstacles, creating a network "cloud." This is convenient for you because any of your wireless devices within the cloud of coverage can easily access the network. It's also convenient for foiling snoops who want to pry into your files or leech off of your Internet access, especially if you live in an apartment building, condo, or townhouse where only thin walls separate you from your neighbors.

Click the Tools tab and then the Admin button in the DI-624 interface or find the tab for administrator tools for any other router. Type a new password and click Apply to make the change. Now find the tab for the wireless settings. For the DI-624, click the Home tab and then click the Wireless button. Look for an SSID (Service Set Identifier) entry and change it from the default setting to any name of your choice. This is the name your wireless network uses, so write it down to easily configure NIC cards later. If you want to revert back to the default SSID for some reason, note that Linksys products commonly use linksys (or linksys-g for 802.11g routers), Netgear uses NETGEAR, Microsoft uses MSNHOME, and D-Link uses default. Avoid using any of those SSIDs to improve security.

You can extend the range of your network with a wireless repeater, such as this one from D-Link.

If a channel setting is available, you can change it to further increase security, as potential hackers tend to use the default settings when trying to access a wireless network. The main security task, however, is to enable WEP (Wired Equivalent Privacy), which encrypts wireless data so any computer that intercepts it cannot unravel it without using the proper decryption key. In the DI-624's wireless tab, select the Enabled radio button in the WEP entry and use the drop-down menu to change the WEP Encryption setting from 64Bit to 128Bit. When it comes to encryption, more bits equals better security, so if your router and other hardware supports 128-bit WEP encryption, use it.

Firewalls are programs or hardware that monitor an Internet connection to make sure all data that enters and leaves a network is authorized, and many routers come with this protection. Turn it on if it is available, but in the case where using the router's firewall is complicated (as is the case with the DI-624, where users must create rules), consider using a software firewall such as Zone Labs' ZoneAlarm (free for basic version; $49.95 for Pro version; www.zonelabs.com) or the firewall included with WinXP. To enable the WinXP firewall, click Start, click My Network Places, click View Network Connections, right-click the icon associated with your Internet connection, and

click Properties. Select the Advanced tab, check the Protect My Computer And Network By Limiting Or Preventing Access To This Computer From The Internet box, and click OK to enable the firewall or click Settings to access advanced configuration options.

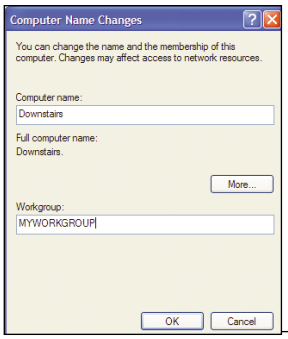
Phase 5: Configure The Router

Now that you've enabled the router's basic security options, it's time to configure a few other settings. Find the WAN settings (click the Home tab and then click WAN for the DI-624). This is where you configure IP addresses if necessary. Call your ISP to see if your account uses dynamic IP addresses (common with cable modem accounts), a static IP address (not common with consumer Internet accounts), or PPPoE (Point-To-Point Protocol over Ethernet; common with DSL [Digital Subscriber Line] accounts). Check the appropriate entry and then enter any necessary information in the settings boxes that appear. A technical support representative at your ISP will have all the data you need to fill these boxes, and those with dynamic IP addresses should be able to select that option and not fill in anything else.

Phase 6: Install & Configure The Wireless NICs

Install a wireless NIC on each computer that you want to have access to the wireless network using the instructions that came with the products. Again, usually you must install the drivers first and then install the wireless hardware. Most wireless NICs use USB interfaces, although some for desktop PCs use a PCI interface, and many NICs designed for notebook computers install in a PC Card slot.

To configure the NICs in WinXP, click Start, click My Network Places, click View All Network Connections, right-click the Wireless Network Connection entry, and click Properties. On the General tab, select Internet Protocol (TCP/IP), click Properties, and select the option dictated by your router or ISP. Return to the Properties window, select the Wireless Networks tab, and make sure you check the Use Windows To Configure My Wireless Network Settings box. If you need to manually add a wireless network, click Add, type the SSID you selected previously in the Network Name box, check the Data Encryption box, and check the box next to The Key Is Provided For Me Automatically. If your router uses authentication (check the documentation), select the Authentication tab and check the appropriate boxes.



Change the workgroup name on all of the computers attached to your network so they all match.

If you have Win98 or WinMe, configure the wireless NIC using the client software provided with the NIC. Read the documentation to find out how to run the software (it should have been installed when you installed the NIC and usually is accessible by double-clicking an icon in the System Tray), and when it loads, change the SSID to the SSID used by your wireless network. For any other settings, use the same values and options selected on the router. For example, if WEP is enabled on the router, use the client software to enable WEP on the NIC.

Phase 7: Test The Connection

If all of the connected PCs can access the Internet, you've won at least half the Wi-Fi battle. Download a few large files, noting the download speed in Kbps (kilobits per second) or KBps (kilobytes per second), depending on the download utility you use, and see if it matches closely with the maximum speed of your broadband Internet connection.

The next test is to find out if the connected PCs can "see" one another on the network and transfer files back and forth. In WinXP click Start, then click My Network Places, and click View Workgroup Computers. The other computers should appear, and you can double-click their entries to access shared folders and drives to transfer files. If they don't appear, the most likely cause is that they are assigned to different workgroups. Give all the PCs on the wireless network the same workgroup name by clicking Start, right-clicking My Computer, clicking Properties, and selecting the Computer Name tab. Put any text you like in the Computer Description box and then click the Change button to enter a workgroup name. For improved security, don't use Microsoft defaults such as WORKGROUP or MSNHOME. Only computers that belong to the same workgroup can see each other and share files over the network.

To access workgroup computers in Win98 or WinMe, double-click Network Neighborhood or My Network Places on the Desktop, double-click Entire Network, and double-click the name of the workgroup you want to access to see the other computers installed there. To change the workgroup name, click Start, expand Settings, click Control Panel, and double-click Network. Select the identification tab, and the text box for the workgroup name appears.

Don't Stop There

Wireless networking isn't just for computers anymore. Devices from PDAs to video game consoles also take advantage of Wi-Fi technology, provided you have the proper equipment. While most devices that have integrated Wi-Fi capabilities or hardware can communicate with a wireless NIC, some devices (such as game consoles) require a Wi-Fi bridge to connect to a wireless network. Bridges work like NICs but require no drivers. If you need to extend your wireless network's range, you can buy wireless repeaters that create their own cloud of coverage, so you can work with wireless products in even the largest house or yard. No matter what needs you have or limitations you face, there's a wireless networking product out there waiting to solve those problems. CE

BY TRACY BAKER

Harman Kardon AVR 330

Connoisseurs appreciate smoothness, be it from cigars, wine, or A/V equipment, and that's precisely what Harman Kardon's AVR 330 delivers. It may not be the most powerful 7.1-channel receiver on the market, offering only 55 watts of power per channel, but it serves up clean audio with enough power to make you forget about that seeming limitation.

Setup is fairly straightforward, thanks to the grouped and labeled connections on the back of the unit. On the audio side, there are seven color-coded 8-ohm speaker outputs, eight preouts including one for a subwoofer, stereo CD and tape inputs, two digital coaxial and two digital optical inputs, plus analog and digital outputs and antenna connections. Videophiles can take advantage of four composite, four S-Video, and two wideband component video connections, and there are composite, S-Video, and coaxial and optical digital audio inputs conveniently located on the front of the unit for quick hookups. The unit also has one 100-watt unswitched and one 50-watt switched outlet on the back that can power other devices.

The front of the receiver has a large alphanumeric display that clearly shows the selected inputs and surround sound modes, as well as the speakers that are currently in use. The large volume knob glows blue around its inner edge, complementing the sleek black and silver case design. It is possible to dim or turn off the display, which is a great feature for distraction-free movie watching.

You can adjust most settings using a menu that appears on a television screen, which requires a composite video connection. Setup took only a few minutes, and the results were impressive. Video signals passed through the unit arrived at the other end without any discernible signal loss, and audio sounded fantastic whether we were auditioning a CD, watching a DVD, or listening to FM radio using the AVR 330's capable integrated tuner. Video games also sounded wonderful when piped through the receiver, which supports all major surround sound formats with the notable exception of Dolby Pro Logic IIx (although Dolby Pro Logic II is an option). It's not a big loss, considering Harman Kardon's proprietary Logic 7 mode expands stereo audio to all available channels and sounds terrific. The unit upconverts composite video to S-Video for improved quality, although component video upconversion would be preferable.

Harman Kardon AVR 330

$799
www.harmankardon.com

About the only aspect of the AVR 330 we didn't care for is the remote control, which is wide at the top and tapers to a fairly narrow point at the bottom. Because the transport controls (Play, Pause, etc.) are located at the bottom, pressing them isn't very comfortable when using the remote with one hand. Fortunately, all of the input selection buttons are located at the top, and the control disc in the middle is easy to operate with a thumb.

The remote control also contains a small microphone, which the AVR 330 uses during an EzSet auto-calibration routine that measures the levels of test signals from all attached speakers. The receiver automatically adjusts the levels so that all of the speakers are balanced, and this is far superior to having to make the adjustments manually by ear or with a sound pressure meter. We were disappointed that EzSet does not adjust the subwoofer level, but that's not very difficult to establish manually. Once the speakers are calibrated, you can establish custom settings for each input, boosting bass when the DVD player is selected, for example, while backing it off a bit for CDs.

If you can settle for 5.1-channel surround sound in your home theater, you can use the two extra channels to create a separate stereo zone in another room (or anywhere else where you can string the necessary wiring). Harman-Kardon includes an additional, smaller remote that controls volume and inputs for the second zone, which operates independently of the primary zone. No matter how you use it, the AVR 330 is worth every penny of its relatively high price despite its somewhat low per-channel power rating.

BY TRACY BAKER

Panasonic PV-GS120 Camcorder

Quick, what's a digital camcorder's most important characteristic? You'd never know that picture quality matters if you judged by the laundry list of features most camcorder manufacturers recite for their products. Panasonic's PV-GS120, on the other hand, puts its focus on picture quality front and center.

A rarity among consumer-level cameras in its price range, the PV-GS120 sports three CCD (charge-coupled device) chips, one each to capture red, blue, and green light. This 3CCD process produces richer colors and clearer shots. The PV-GS120 records 540-line video to MiniDV cassettes and 1.2MP (megapixel) still pictures to SD (Secure Digital) cards. It also offers a bevy of manual controls (focus, exposure, gain, white balance) and connections (including FireWire, USB 1.1, S-Video, and A/V composite jacks). The PV-GS120's expandability is excellent.

Panasonic PV-GS120 Camcorder

$699.95
www.panasonic.com

You can use a variety of lenses, filters, lamps, and microphones with it.

The portable camcorder measures just 2.8 inches high x 3 inches wide x 5 inches deep. You'll have to pause shooting to access the camcorder's menu, and navigating its options requires you to open the LCD to access the control buttons. The 2.5-inch LCD's narrow viewing angle is also a hassle. On the other hand, the Photo Shot button makes it easy to capture stills while shooting video.

The effect of 3CCDs is apparent in the PV-GS120's image quality. It captures sharp video with excellent color under all conditions, even in relatively low-light conditions. You can improve the image quality even more using the camcorder's manual controls over gain, shutter, and white balance settings, though the automatic options do a good job adjusting for shooting conditions. The camcorder's autofocus and auto-exposure adjustments lag behind rapid movement of the camcorder, but not unreasonably so. Though the built-in microphone didn't pick up mechanical noise from the camera, its sound is overly "boomy" and hollow. But you can use an external microphone, lamp, and tripod when quality really matters.

The PV-GS120 is a good value as 3CCD-quality is hard to beat for the price. The unit offers plenty of other enhancements, as well. It's a bargain for those seeking high-quality home video.

BY GREGORY ANDERSON

Paradigm Cinema 70 HTIB

In the market for some small speakers that deliver big sound? Paradigm's Cinema 70 speaker setup is the ticket to a home theater that sounds swell, but you'll need plenty of extra equipment to take advantage of them.

Paradigm Cinema 70 HTIB

$549
www.paradigm.ca

Although the name suggests that this is an HTIB (home-theater-in-a-box) package, there is no receiver or DVD player included with the Cinema 70 HTIB. The box simply contains five identical satellite speakers and a powered subwoofer. Each speaker measures 7 inches high x 4.25 inches wide x 5.5 inches deep, is rated for 40 watts, and is designed for use with amplifiers in the 15-watt to 80-watt range. The subwoofer is rated for 90 rms (root mean square) watts of power or up to 270 watts of peak power and has knobs to adjust the overall volume and crossover frequency.

The Cinema 70 HTIB is certainly suitable for a basic 5.1-channel setup, although the front center speaker looks a little wonky sitting on top of a television because of its vertical orientation. Paradigm has an optional 50-watt Cinema CC center channel speaker available that would look (and presumably sound) much better, thanks to a horizontal orientation and trio of drivers compared to the pair of drivers found in each of the satellite speakers.

In our tests, the Cinema 70 HTIB provided clean sound, with sparkling highs, a rich midrange, and deep bass from the satellites that was seamlessly expanded by the subwoofer. CDs and FM radio sounded great, but the system was really in its element when we watched movies or played games with 5.1-channel soundtracks. Many speakers of this size tend to become shrill at high volume levels, but the Cinema 70 speakers maintained their composure even at the upper fringe of their maximum output levels.

The Cinema 70 HTIB makes a terrific starter speaker set for a modest home theater setup, and customers can easily order an extra satellite or two to utilize all the channels on their high-end receivers or buy the Cinema CC to provide a more robust center channel. It's also a good choice for those who want the convenience of matched speaker sets that HTIB products provide.

BY TRACY BAKER

Kenwood Excelon KAC-X621 Amplifier

The Kenwood Excelon KAC-X621 amplifier does more than just take your car's audio system to a whole new level. Its stronger and cleaner sound is only the beginning. This amplifier's controls, flexibility, and compatibility make it an excellent addition to your car's stereo system if you're ready to get serious about car audio.

Kenwood Excelon KAC-X621

$500
www.kenwoodusa.com

Amps normally come into the picture during the second stage of an auto sound upgrade project. After swapping out factory head units and speakers (typically a first-stage upgrade), most people look for a subwoofer and, consequently, an amplifier to power it. Kicking up the bass is all right, but don't overlook the benefits of a more powerful mid- and high-frequency audio stream, which a good amp can also provide when connected to your car's speakers. For those of us more concerned with good sound than shaking the rearview mirror, a 2-channel amp feeding high-quality speakers is the optimal next step.

Not that the Excelon KAC-X621 is lacking in power: Rated at 179 rms (root mean square) watts per channel at 4 ohms, it has enough strength for anything your ears can handle inside a vehicle. Kenwood's Power Doubler Circuitry doubles the output of both channels when driven to 2 ohms. If you bridge the channels, you get 612 watts (rms at 4 ohms). And, with a frequency range of 5Hz to 70KHz (both values well outside the human ear's range), Kenwood isn't sacrificing any of the audio spectrum.

Let's get the basics out of the way first. The Excelon KAS-X621 is compact (2.4 inches high x 17.6 inches wide x 10.4 inches deep), so it fits nicely in any well-ventilated and out-of-the-way space, even in small cars. Its connectors and controls are well-organized and accessible. We had our local pros (at AutoSounds in Lincoln, Neb.) install the unit, but the process is straightforward: Run the power cable from your car's power source to the amp, connect the amp to the head unit, and wire up the speakers. One of the Excelon line's bonus features is Kenwood's Amplifier Management System. AMS lets you configure amp settings from the dash when using a compatible head unit and control cable instead of crawling around in the trunk with a flashlight to tweak frequency or gain. The system works great and is much appreciated when you're trying to calibrate the system or adjust to different environments or sources.

If you don't have an AMS-compatible head unit, the menu system on the amp itself is easy to manipulate. Use the Menu button and the directional arrows to scroll through and configure Bass, Treble, Volume, and other options. The instructions provided in the users manual are clear and helpful in this regard, though be sure to install your unit with an eye toward accessibility of its controls and buttons. An aluminum cover protects the amp's Gain, Crossover, and other controls and is held in place by Allen-head screws; you'll need to remove the cover to adjust these settings.

We reviewed the amp with Kenwood's Excelon KDC-X579 head unit, which we covered last month. The Excelon KAC-X621's sound is powerful and clear with all sources and at all volume levels. It produces a rich audio field with a full stage at all frequencies. And, it's dead crisp when you crank up the volume. You probably get the picture. We were very impressed. You can even string several units together with S-Video cables, supplying power to additional speakers and/or subwoofers, and control them all separately from an AMS-compatible head unit. And, if you're dividing high-frequency and low-frequency duties between dedicated amps, the Excelon KAC-X621 has selectable high-pass and low-pass crossovers to set it up.

With a $500 MSRP (less than $400 street), the Excelon KAC-X621 isn't objectively cheap. But it's competitive with other amps in its class and has the extra benefits of integration and ease-of-use with a compatible system. If you spend a lot of time in your car or want to get the most out of your sound system, we recommend the Excelon KAC-X621 (either with the Excelon KDC-X579 or by itself) as a great way to kick up your car's audio a notch or two.

BY GREGORY ANDERSON

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Super G™ Technology – 10X Faster

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108 Mbps 2.4 GHz 802.11g

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WAG311
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WG511
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WGR614
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WG121
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B&W CWM 650 In-wall Speaker

One of the keys to the burgeoning popularity of home theaters was the advent of 6-channel sound systems. Able to replicate the theater experience in the home, these sound systems quickly became popular across the country. A key component of 6-channel systems is a pair of quality surround sound speakers for reproducing the atmospheric effects that give audiences an immersive audio experience. In the CWM 650, B&W (Bowers & Wilkins) has created an in-wall surround sound speaker that entices an audience with an auditory experience that completes the illusion of "being there."

B&W clearly understands that while power is an important element to any speaker design, clarity and control are often more valuable in creating an excellent audio experience. With the CWM 650, B&W's assembled a surround sound speaker that is suitable for most home audio systems.

The CWM 650 generated extremely crisp sounds, which were an auditory delight, through its 8-inch Kevlar cone. When the soundtrack needed high frequency effects, the 1-inch metal tweeter was more than capable of handling the sharpest tones. The CWM 650 has a frequency response of 50Hz to 20KHz and delivers up to 130 rms (root mean square) watts of power.

B&W CWM 650 In-wall Speaker

$300 each
www.bwspeakers.com

For you hardcore technical junkies, the CWM 650 has a sensitivity of 89dB (decibels). The recommended cable impedance for optimal performance is 8 ohms, and the crossover frequency is 3.5KHz. Each speaker measures 12.2 inches high x 8.5 inches wide x 3.3 inches deep.

Besides featuring performance that can make your house squeal, the CWM 650 features the understated styling that has become a trademark of B&W. A simple, white grille helps the CWM 650 blend unobtrusively into your wall, and you can paint the grille to match your interior decoration. Whether you keep your CWM 650s out of sight or prominently displayed, you'll soon appreciate the subtle quality they deliver at a price that won't break the bank.

BY CHRIS JACKSON

Loewe Aconda ACO 9303

Like any shift in technology, the introduction of HDTV has created opportunities for smaller manufacturers to step into the marketplace with wares that can rival the best products from electronic giants such as Sony. A perfect example of this is the Aconda ACO 9303 TV from Loewe.

Loewe may not be a household name in the United States, but its reputation for building high-quality televisions is well-known in videophile circles, as well as in Europe. Headquartered in Germany, Loewe focuses on HD-capable sets and home theater sound systems.

Loewe Aconda ACO 9303

$2,500
www.loeweus.com

At first glance, the most noticeable thing about the ACO 9303 is its styling. Although the constraints imposed by using a CRT means that TV designs can't vary dramatically, the ACO 9303 has crisp, clean lines that stem from its Euro heritage. Think of it as the Volvo of TVs.

However, the beauty is more than skin deep. When displaying standard-definition content, the ACO 9303's 30-inch screen is crisp and clear. We watched "The Lord of the Rings: The Two Towers" and the TV produced an excellent image. During night scenes, the depth of detail was remarkable, and the ACO 9303 reproduced black as a true black instead of a dark grey, as many sets do.

In addition to its excellent tonal range, the ACO 9303 did an excellent job of faithfully reproducing the original colors of the source material. This was without calibrating the set. Too often the factory precalibrates a TV with too much emphasis on red, distorting flesh tones. Although we'd normally recommend having a set of this quality ISF (Imaging Science Foundation)-calibrated, the ACO 9303 performed well right out of the box.

We found that watching HD content on the ACO 9303 was very rewarding. The widescreen format and flat picture tube of the ACO 9303 created a vivid image that revealed details that standard-definition content simply can't reproduce. Unfortunately, the ACO 9303 lacks a DVI or HDMI input and has only one set of component inputs. You can also connect devices using its composite, VGA (Video Graphics Array), and S-Video inputs, but you won't be able to watch HD content using these connections. For this price, consumers should reasonably expect more inputs.

The ACO 9303 isn't an economically-priced display, but if you're looking for a set that will handle both SD and HD content with aplomb, and with a European sense of style, you'll be hard pressed to find a better set than this one by Loewe.

BY CHRIS JACKSON

CE Face-Off

Subwoofers ($500 To $750)

Adding a subwoofer to an existing sound system can be an ear-opening experience. Even if you feel you've been getting good bass response from your main full-range speakers, a good subwoofer can open up a whole new subterranean world in which you never knew what you were missing. And a sub is essential if you want to get the most out of DVDs.

A subwoofer yields two main benefits: First, and most obviously, you'll extend the reach of your system, creating deeper frequencies than multimedia, bookshelf, and even most large floor-standing speakers are able. Second, by taking some of the sonic load off your system's main speakers and shifting the low-end burden to a driver tailor-made for bass, you can improve the system's overall power-handling efficiency and clarity.

Bassics

To confine its frequency response to bass, a subwoofer uses a **low-pass filter**, circuitry that lets low frequencies play through while rolling off the higher frequencies above a cutoff point. Setting that cutoff, known as the **crossover frequency** (the point at which the

How Low Can You Go?

Even if your receiver has a Sub Out jack, you may still want to connect your subwoofer to your receiver's speaker-level outputs. Not all subs let you bypass their internal filter, possibly creating a setup that degrades your bass signal by filtering it twice. Also, although some receivers generate a subwoofer signal from stereo material, others send no sub signal at all when in stereo mode, so your subwoofer sits idle while you're playing CDs.

So let's walk through a speaker-level setup. Although we're using the Klipsch RW-12 for illustration, much of the following will apply to many other units.

1 With all components turned off, run dual lines from your receiver's main/front speakers' positive and negative outputs: one set to your main speakers' inputs, and the other to the sub's speaker-level inputs. (Some subwoofers have extra pass-through outputs that let you connect the main speakers to the sub, instead—a more elegant arrangement in our view, but not available on the RW-12.)

2 Now power on. If you're using a multichannel receiver, access its setup menu and classify the front speakers as Large. Although it sounds counterintuitive, in your receiver's menu, set the subwoofer to Off (or No, depending on menu wording). This will route the full audio spectrum, including all bass content (even an encoded LFE [low-frequency effects] channel), to the front speakers.

3 While playing audio, adjust the subwoofer's volume until it matches that of the main speakers. Rather than music, a better choice is the receiver's built-in test tones, if applicable, or pink noise (broadband noise such as an empty FM radio band). An assistant will come in handy here, with one of you in the listening position while the other makes adjustments.

When you want to connect your subwoofer to your receiver's speaker-level outputs, but the sub lacks pass-through speaker-level outputs, you'll need to run dual lines from your receiver to both your main speakers and the subwoofer.

4 Adjust the sub's Low Pass knob to pick up the bass at the point your main speakers leave off, without either creating a hole, in which a span of frequencies drops out, or overlapping frequencies, so the doubling-up makes a range of notes overly prominent. If you know your main speakers' specifications, this will give you a starting point to focus on.

5 Adjust the Phase knob until you find the point at which the bass sounds most prominent. (With phase switches, this is a simple either/or choice.)

Your goal is to create a seamless blend between the subwoofer and the main speakers. Because of the interactive influence between the various controls, you may have to tweak them a few times to find the optimal combination of settings. But it's there. Experiment and be patient, and you'll find it.

subwoofer takes over bass from your main speakers) is one of the most important aspects of installing a sub.

If you're using your receiver's Sub Out jack, this may or may not be much of an issue. Some receivers let you set a specific internal crossover. Other receivers use a couple of default frequencies by designating your speakers as Large or Small. A Small setting (for bookshelf and satellite speakers) will route a wider range of bass content to the sub. A Large setting (for floorstanding and other speakers that already have solid bass) will restrict the subwoofer output to the lowest lows.

If you're connecting the sub to your receiver's main speaker-level outputs, setting the crossover is definitely your responsibility. For more about this, see the "How Low Can You Go?" sidebar.

Swimming In The Deep End

As with nearly anything you can add to a home entertainment system, subwoofers come in a wide price range. You can pick one up for a few dozen dollars (not recommended!) or buy one that costs more than the car you might use to drive it home.

By limiting our roundup to units whose list prices fall within the relatively narrow range of $500 to $750 (MSRP), we're in the low end of what's considered reasonable, while still budgeting enough for quality. Hardcore bass fiends might shrug at some of the specs at this level, but for most people, listening in rooms of normal size, subs at these power and price levels can deliver all the bass they're likely to need for music and movies.

We fed our four test units a diet of both. In addition to general use, we also tried each sub with a group of discs featuring material we were familiar with.

For music, we used several types of bass-heavy content: acoustic, electric, and synthesized, both dynamically articulated and droning, and even a recording of some thunderous war drums. Reggae, with its bouncy rhythms and usually uncluttered instrumentation, is one style of music that makes it easy to focus on the bass.

For movies, we rotated through a few DVDs with scenes that provide ample slam. "The Lord of the Rings: The Fellowship of the Ring" has an excellent variety of LFE (low-frequency effects) to test a sub's mettle. The entire Mines of Moria sequence is useful, from the entrance collapse to the cave troll attack to Gandalf's showdown with the Balrog.

In addition to each sub's performance, we looked at build quality, design, features, and of course, did so while keeping one eye on the unit's price. We also kept the playing field as level as possible, leaving the receiver's output flat, neither cutting nor boosting tone or **send levels** (volume control specific to an individual channel). We also opted for a middle ground when it came to placement. Any subwoofer will sound loudest when placed in a corner, and quietest when located in the interior of a room. We compromised by backing each sub against a single wall to provide a medium level of natural amplification.

Among our four subs, there are a few aspects in common. All are powered, requiring an electrical connection, and can be left on permanently, with the units dropping into standby mode after a brief period without a signal. Their cabinets are solidly constructed of MDF (medium density fiberboard), and most have a vinyl veneer finish. With one exception, all wattages mentioned are rms (root mean square) rather than peak power.

Now let's zoom in, crank up, and see what they're made of.

Cambridge SoundWorks Newton Series P200

$599.99
www.cambridgesoundworks.com

One of the smaller subs here, the P200 measures 13.75 inches high x 12 inches wide x 13.5 inches deep. Its sealed enclosure weighs 35 pounds. The 10-inch front-firing polymer laminate woofer is anchored in one of the thickest, sturdiest rubber surrounds we've seen, and its 25Hz to 200Hz frequency range has the highest reach in our group, making it a good match for small speakers that are seriously lacking in the lower frequency range.

Cambridge Soundworks Newton Series P200

The P200 comes with your choice of rubber feet or carpet spikes, and aims to make system integration easy. The line-level connection (from the Sub Out jack) automatically bypasses the sub's internal filter. If you're opting for speaker-level connections, you can set the crossover between 60Hz and 200Hz. The frequency knob (called Low Pass) is conveniently labeled with five interim frequencies, and the manual includes a chart with crossover recommendations for other Cambridge SoundWorks speakers, as well as general speaker types. Very thoughtful.

The controls are grouped into a horizontal panel across the bottom rear, making them inconvenient for quick adjustments. There are no pass-through outputs for main speakers, although you can make the speaker wire connections in a removable plug that then slots into the back panel. Given the small jacks, this convenience is appreciated.

As for performance, at 200 watts, the P200 was a bit underpowered for our tastes. It exhibited solid punch during dynamic events, but then seemed to fade too low, even with the level cranked to maximum. The only way to get the steady oomph we wanted was through a switch that adds 3dB of volume but raises the bottom frequency to just 35Hz. It definitely increases the volume, but at the expense of the lowest lows, necessitating an either/or choice. Its volume was close

enough, however, that switching to a corner installation added sufficient natural boost to bring its level up to par.

Infinity PS-12

$499
www.infinitysystems.com

With a cabinet totaling 2.4 cubic feet (16.5 inches x 14.38 inches x 17.5 inches) and weighing 45 pounds, this is one of the heavyweights in the bunch. The enclosure houses a front-firing, anodized aluminum 12-inch woofer backed by a large rear port.

The frequency response spans 25Hz to 150Hz, with the crossover adjustable between 50Hz and 150Hz. The knob, however, lists only the high and low frequencies, with just a few unlabeled marks between, a frustrating omission if you're using the sub's internal crossover to try to nail a specific frequency. As with the Cambridge SoundWorks P200, plugging into the line-level jack bypasses the sub's filter. Here, too, we bemoaned the lack of pass-through outputs for branching off your main speakers (in this case, there's certainly room for them), although the binding posts for the speaker inputs are stout and easy to work with.

We also like the vertical positioning of the back control panel, which puts the volume knob just below the top edge, so it's easy to grab, sight-unseen, for quick adjustments to your standard level.

Klipsch Reference Series RW-12

We found that the PS-12's 300 watts made for a seamless volume blend with the level set close to maximum, with a little headroom left over in case we needed to compensate for bass-light material. The articulation along the full bass range was smooth, with tight thumps and thwaps on dynamic material, and a nice low, lingering follow-through. It proved equally adept at both music and movies, providing a solid foundation without ever becoming overpowering.

Klipsch Reference Series RW-12

$650
www.klipsch.com

With its copper-toned 12-inch ceramic-and-metal woofer and cherry finish (also available in black ash), the RW-12 is beautiful, as well as big. At 19 inches x 14.6 inches x 21 inches (3.37 cubic feet) and 49 pounds, it qualifies as furniture. It's no sonic lightweight, either. The frequency response spans 21Hz to 120Hz (crossover adjustable from 40Hz to 120Hz), and is backed by 340 watts.

The RW-12 offers some unique features, starting with a well-disguised port that opens along the lower front edge, which redirects its energy out the front along with the woofer. It also comes with three types of inputs: speaker-level binding posts (no pass-through outputs), a mono LFE jack for a single-line connection to a receiver's Sub Out (with automatic crossover bypass), and left and right line-level inputs from a stereo Sub Out. The unit includes a Y-adapter for splitting the LFE signal into the left and right inputs for enhanced performance. And we loved the big rubberized level knob located on the right front side, which makes quick adjustments a breeze.

Infinity PS-12

Finally, our other three subwoofers feature a 0°/180° **phase switch** (when the sub and main speakers are installed at different distances from the listening position, a phase control can better align the output timing so the subwoofer's sound waves reach your ears when they're supposed to). But the RW-12 improves on that with a continuously variable knob, which gives you more control than a switch, letting you dial in a more accurate blend.

Our only gripe was with the standby mode: The sub didn't always awaken when a signal came through, although a flip of the On/Auto toggle switch perked it right up. Otherwise, its performance was sterling, with a snappy response and a big, deep, full-throated sound that put sonic muscle into music, while its depth and power furnished truly concussive explosions, impacts, and other low-frequency effects.

Pinnacle Speakers SubSonic

$699
www.pinnaclespeakers.com

Since its emergence in 1976, Pinnacle Speakers has earned a reputation for quality and innovation, and the SubSonic exemplifies both. Its size/sound ratio is almost unreal. Minus its speaker grills, the sturdy brass isolation cones it perches on, and the heat-radiating fins on the control panel, the SubSonic is a compact cube measuring just 7.88 inches per side. Yet it weighs a cinder block-like 22 pounds.

Instead of using a single large woofer, the SubSonic employs a bipole design, its sealed enclosure housing two 6.5-inch heavyweight fibercone woofers that fire from opposite sides. Although it definitely heads to the basement, because of its size it doesn't dig for bedrock: From a high of 150Hz, the frequency response bottoms out at 28Hz, with a crossover range of 50Hz to 150Hz.

Even so, the SubSonic sounds plenty deep, pumping out an incredibly big sound for such a tiny box. Its 350 watts (peak power; rms watts not supplied) leave ample headroom, as well. In setting an optimal volume blend, we usually had the level well below maximum. Its response was articulate and quite nimble, a very musical sub.

Further pluses: This is the only one of our four units with pass-through outputs for the main speakers. Like the inputs, they're clips, rather than binding posts, but we're impressed they found room for them. When using the line-level connection, you'll need to activate a dedicated crossover bypass switch. As on the Infinity, the control panel isolates the volume knob near the top. Finally, the SubSonic's phase switch made the biggest difference of any in the group, even with the unit installed in the same location as the others.

Pinnacle Speakers SubSonic

Most Wanted Features

Subwoofers are designed to do just one thing—play bass—so they're not the most full-featured components in the room. Still, a few vital variables determine how they get the job done.

Size matters. Usually. Little marvels such as Pinnacle's SubSonic are an impressive exception, but in general, sonic mass and physical mass go together. Hefty subs that approach the size of hassocks have the bulk, solidity, and woofer size to dig deepest.

Ported vs. sealed enclosures. Subs come in two basic designs: sealed (also called acoustic suspension) and ported (also called bass reflex). A port is an opening in the cabinet, usually in the back, that facilitates airflow and provides an exit for sound waves coming off the rear of the woofer. All else being equal, a ported sub will play 2dB to 3dB louder than a sealed sub, but in comparison can lose some articulation and bass extension (frequency depth). So be aware of these general tendencies in whichever design you're auditioning, to see if the unit overcomes them.

Low THD. Definitions for Total Harmonic Distortion can get quite mathematically involved. Suffice to say in this context that it measures a speaker's propensity to add extra frequencies, called harmonics, that aren't present in the original audio signal. Some subwoofers specify THD as high as 20% and 30%, amounts that erode audio clarity, so the lower the measurement, the better. Three of our units specify THD from <2% to <0.1%; Pinnacle does not publish THD ratings.

Crossover bypass. This matters if you're using a receiver's Sub Out jack. Because both the receiver and subwoofer have low-pass filters, you don't want to filter the signal twice, which could cause an anomalous dip in frequency response. Whether the unit has a bypass switch, or it engages automatically when plugging into the line-level input, make sure you can override the sub's filter when the receiver is handling the crossover.

The Lowdown

All four of these subs have commendable features. In particular, Infinity's PS-12 provides rock-solid performance at a bargain price, and with Pinnacle's SubSonic, you can still get big, bold bass even if your free floor space is almost nonexistent.

But after weighing cost and features, we give the nod to Klipsch's RW-12. Its overall performance was unsurpassed, its power and bass extension pack a physical wallop, and such bonuses as the three types of inputs, variable phase control, and convenient volume knob give it an edge. If you have the room for it, the RW-12 will make its presence felt and heard.

Amazing bass, how sweet the sound.

BY BRIAN HODGE

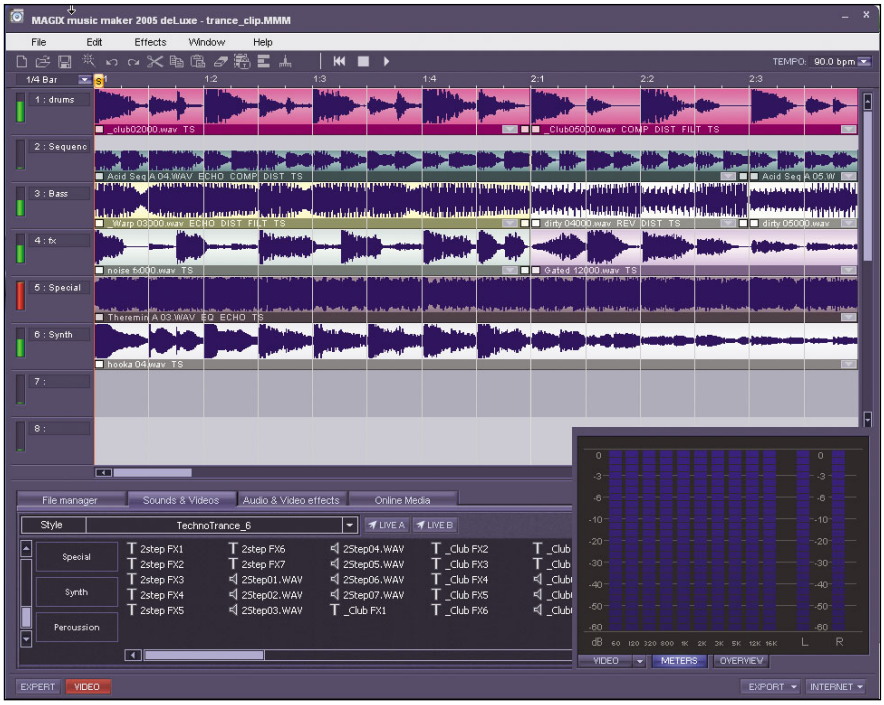
Magix music maker 2005 deLuxe

If you have an inner DJ dying to get out, open up to Magix music maker 2005 deLuxe. This stimulating piece of software has a nearly endless variety of ways to help you create your own music, remix existing tracks, and publish your creations.

Setting up music maker is the easy part. Just check your machine's configuration and walk through the standard setup utility. The software's system requirements include a 450MHz processor, 128MB of RAM, a 16-bit sound card, and at least 350MB of hard drive space. Based on our experience with the program, though, such a setup will be vastly underpowered. We recommend at least a 1.5GHz processor and 256MB of RAM for a program that demands so much of your machine's multimedia capabilities.

It may take you awhile to learn to use the program. It's easy to be intimidated by the program's array of tools and options and the depth of control you have over every aspect of composition. But start simple and conquer the program one piece at a time. After you install music maker, take some time to read the users manual and work through the included tutorial. There are plenty of other help resources in the program and online; use them as you expand your exposure to music maker's features.

For starters, music maker 2005 deLuxe includes thousands of prerecorded loops and samples that you can manipulate. They're organized into styles (Hip Hop, Score, Trance) and instruments (Bass, Drums, Vocals, Synth). Simply click an item to preview it and then drag and drop your selection into the Project View and organize its placement relative to all the other elements in the composition. You can also import a variety of file formats, as well as audio CDs tracks and MIDI (Musical Instrument Digital Interface) files, using the File Manager and built-in remixing tools. Text-to-speech effects and a vocal tuner help add your own words to the mix.



Magix music maker 2005 deLuxe
$59.99
www.magix.com

You can manipulate each item further with the Audio FX Rack. Adjust equalizer settings, Reverb, Echo, filters, Volume, and other elements from an intuitive pop-up window. Don't be afraid to fiddle with all the knobs and see what happens. Each section has a Reset button that reverts the selection to its previous condition. If you still haven't had enough, create your own clips with one of the 12 built-in synthesizers (including a piano, guitar, virtual scratch box, and a new drum machine). Once you learn to use these tools, there's very little you can't do. When you're finished, create a CD master or export your music to any of a variety of file formats, including WAV, MP3, or Real Media. Add video from included or imported sources, with a variety of special effects, to show off even more creative potential.

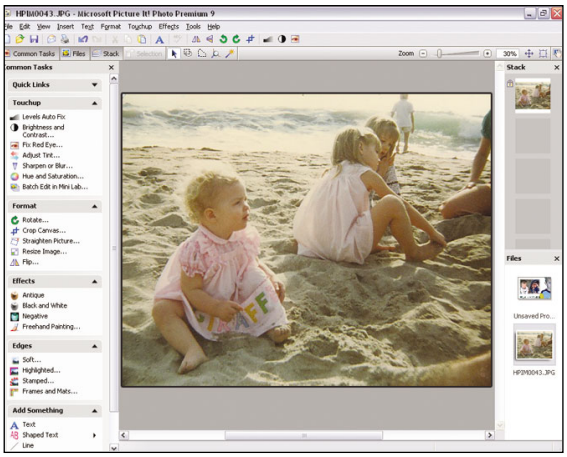
We found music maker's interface to be accessible and intuitive. The Song Maker Wizard is a great way to start quickly and autogenerate music for a Web site, presentation, or home movie. It's also useful for building a baseline track, from which you can tweak and build up a fuller composition. Just launch the tool from the File menu, select a music style and instrument ensemble, define the length of the track to create, and create an arrangement. Selectively replace certain parts of the computer-created track, or re-create new ones until you come up with something you like.

Remember, this isn't the kind of program you can learn to use well in an evening or two. Give yourself plenty of time and exercise patience. Begin with some basic tasks when you first begin using the program, but realize that there are enough features here to keep you busy learning new things months from now.

For anyone interested in creating music from your PC, either remixed or from scratch, Magix music maker 2005 deLuxe is a powerful and user-friendly tool.

BY GREGORY ANDERSON

Microsoft Picture It! Photo Premium 9



Microsoft Picture It! Photo Premium 9
$49.95
www.microsoft.com

Professional image editing has long been the domain of high-end workstation hardware and expensive software. The industry's gold standard professional application costs $650. So what can you expect for less than $50? Quite a lot, as it turns out.

Getting started with Picture It! Photo Premium is easy; the users manual is well-organized, moving from the very basics to intermediate tasks in a short time.

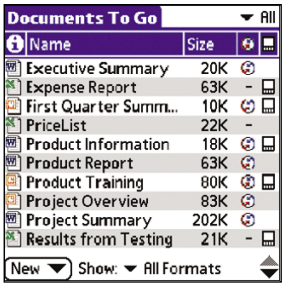
The program's features are more robust than we expected. Picture It! Photo Premium opens most major image formats, including PSD, EPS (Encapsulated PostScript), GIF (Graphics Interchange Format), JPEG (Joint Picture Experts Group), TIFF (Tagged Image File Format), and BMP (bit map) files. It offers the main image-editing tools most users need: cropping, resizing, selection, and layering (called Objects). Microsoft also threw in a variety of adjustments (levels, contrast, tint), filters (sharpen, blur, and artistic redrawings), and effects (scratch and red-eye removal, for example). The Mini Lab feature handles images in batches for renaming, resizing, cropping, copying, and changing formats en masse.

We found the interface helpful without being overwhelming. The left side contains a list of common actions and tools that display their options when selected. The right side lays out the current image's objects and a palette of all currently open images. The result is an intuitive screen that highlights the most common functions while making more advanced options readily available.

You have to get pretty far into photo editing before running up against Picture It! Photo Premium's limits. For anyone with basic to moderate image-editing needs, Picture It! Photo Premium is a great value.

BY GREGORY ANDERSON

DataViz Documents To Go Premium Edition 6.0



DataViz Documents To Go Premium Edition 6.0
$49.99
www.dataviz.com

As Palm OS devices evolve from electronic address books to mobile computers, portable productivity applications become more important. Documents To Go, from DataViz, is the leader in that field. In fact, it's the top-selling Palm OS app overall, according to NPD Intelect.

We looked at the Premium Edition of the latest version, which adds all kinds of functionality to the Standard edition's support for basic word processor and spreadsheet files but stops short of support for full Outlook Contacts and Calendar interoperability. Any handheld productivity suite must be compatible with MS Office. Documents To Go goes a step further. It works with a variety of suites and apps (including WordPerfect, Quattro Pro, and AppleWorks). You'll need Palm OS 3.5 or higher with 3.5MB of free memory and a desktop system running Windows 98 or newer or Mac OS9 or newer.

The program transfers, creates, edits, saves, and syncs word processor, spreadsheet, and presentation files in their native formats. In other words, transfer a Word doc to your handheld or memory card and then work on it with Documents To Go. Premium Edition also supports embedded images, charts, and password protection, and includes a spell checker and PDF viewing. It does all those things exactly as advertised; we had no trouble with any of the program's main functions. The on-screen buttons and menus mirror common functions in desktop applications, so there's very little learning curve.

Our only concern is the method of data input. Trying to write or enter any significant amount of text or numbers using Graffiti is tedious and slow.

We found Documents To Go to be a tremendous asset for people on the move. It's sure easier than firing up a notebook computer, and it's a lot more portable. With a decent-sized screen and a good way to enter information, $50 is a steal for what Documents To Go adds to your handheld.

BY GREGORY ANDERSON

Give *your* car the luxury of satellite navigation.

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The StreetPilot® II from Garmin has features found in expensive in-dash navigation systems, plus one very important quality the others don't have. StreetPilot II is portable, so you can have the best in GPS navigation in any car you drive. Look up addresses, attractions and other services, and StreetPilot II will create a route and provide turn-by-turn directions with voice prompts to get you there.

StreetPilot II and GPS V from Garmin. Navigation for every car.

GARMIN. www.garmin.com 1.800.4G.GARMIN

Available at: BEST BUY CompUSA

CE Lite

On The Lighter Side Of Technology

Compiled by Marty Sems

Jakks Pacific TV Games

Get wet 'n' wild on TV! SpongeBob Square Pants joins Jakks Pacific's line of console games-in-a-joystick, which connects to your TV's video and audio RCA inputs (about $24.95; www.jakkstvgames.com). You'll get to maneuver Sandy Cheeks, Patrick, and our cellulose hero through five aquatic games. Enemies menacing Bikini Bottom include the nefarious Plankton, various fishermen, and a "giant bull worm." More importantly, the joystick's design means that you finally get to seize SpongeBob's head and manhandle his nose like you've always wanted to. We also revisited 10 games from our rascal days with Jakks' Activision stick. That one included Pitfall and River Raid, but our demo unit displayed bad graphics artifacts everywhere except the main menu. Oh, and if you feel something tingling, it's your spider sense. A Spider-Man TV Game is coming this fall.

TDK I'mASpeaker

Someone might have a use for a CD case that doubles as powered speakers. We're not saying we do, but someone might. No, TDK's I'mASpeaker isn't a CD player, but it will give voice to whatever audio you feed it from your iPod, personal disc player, or cufflink microphone. New additions to the line cover a spectrum of colors, such as orange, blue, and purple. The latest I'mASpeakers cost $24.99 for a 12-disc version with one flat NXT speaker or $34.99 for the 24-CD, dual-speaker model (www.tdk.com). Two or three AA batteries power the speakers for about seven to eight hours at a time.

Belkin Digital Camera Link For iPod

Haven't figured out how to write off that iPod as an expense? Belkin is here to help. Its Digital Camera Link (model number F8E477; $89.99; www.belkin.com) turns your iPod into a photo dump so you can empty your camera's memory card and keep on snappin'. The Link is compatible with DCF- and PTP-compliant digicams. iPods with software version 2.1 or later will automatically support the Link, but iPod minis won't.

Swedx Wireless Mice

Someone in Sweden stopped short one day and said, "There are mice in those trees." His friends all laughed and called him a "lergy fyergy," or something like that. But who's laughing now? Today, that insightful Swede is probably making a killing selling wooden computer mice while his shortsighted friends grow arthritic carving and sanding them all. Shown here are two $80 examples, the XMW1-AS1 (ash) and XMW1-SP1 (sapele). Both are optical mice with 800dpi resolution. Swedx also hawks wired versions ($42), wood-framed monitors ($510 to $675), and wooden standard keyboards ($60). Look 'em up at www.swedx.se; buy them at shop.webopolis.com.

VisiKey Enhanced Visibility Internet Keyboard

Eyestrain is a very real problem in this age of a computer at every desk. Many users also suffer from visual impairments, such as macular degeneration, but still need to use a PC at work or at home. VisiKey's new large-font keyboard ($39.99; www.visikey.net) could help users who are having trouble discerning the characters at their fingertips. The keyboard isn't split into a more ergonomic layout, but it does have media and Internet shortcut keys, plus uniquely shaped cursor keys. There's even a wireless version available for $79.95, which includes a cordless optical mouse.

Plextor ConvertX PX-AV100U

You probably already know about Plextor's ConvertX, an external video encoder that simplifies the journey of your footage between your camcorder and PC. New to the ConvertX line is an entry-level model, the PX-AV100U ($79; www.plextor.com). Technically, this is a capture device, as it leaves all the encoding to your computer's CPU instead of doing it in hardware. Plextor's software can convert the captured video to MPEG (Moving Picture Experts Group)-1 or -2 on-the-fly or to MPEG-4 or DivX in a second pass, all without any loss of resolution. In other words, with this budget ConvertX, you'll trade a little speed for a lower price. The bus-powered PX-AV100U comes with a one-year warranty, plus Plextor's customary unlimited, toll-free phone tech support.

Music & Movies

The Latest Tracks & Flicks: Are You Not Entertained?

Velvet Revolver

"Contraband"
RCA Records
www.rcarecords.com
Our take: Axl Rose, eat your heart out.

After auditioning dozens of singers for their new group (including Skid Row's Sebastian Bach and reportedly even Billy Idol), ex-Guns N' Roses mates Slash, Duff McKagan, and Matt Sorum finally settled on troubled Stone Temple Pilots frontman Scott Weiland to complete Velvet Revolver. With former Suicidal Tendencies guitarist Dave Kushner also in tow, the ex-GNR boys made a wise choice: Weiland is a perfect match for the hard-living, full-throttle guitar assault that is Velvet Revolver. It doesn't hurt that Weiland's numerous run-ins with the law and stints in drug rehab give him the seediness necessary to pull off the tunes on "Contraband."

Supergroup hoopla aside, the songs on "Contraband" stand on their own merit, creating what amounts to a flat-out terrific rock record. Occasionally it takes a band like Velvet Revolver to remind us what it is about rock that attracted us in the first place, namely screaming guitars, blistering solos, and aggression to spare. A verse into "Sucker Train Blues," the album's opening cut, and you know Velvet Revolver has the formula down. By the time "Contraband" winds to the radio-friendly "Slither," it's apparent that Velvet Revolver is capable of sticking around awhile and making some noise, in more ways than one.

Slash and Weiland are the standouts here. Slash has had his moments since GNR's glory days, but matched with Weiland's ferocity, he finally has a lead singer again that can counterbalance his shredding solos. Take "Big Machine," for example. While Weiland is lamenting on the woes of celebrity ("It's a big machine, it's a big machine/we're all slaves to a big machine") Slash is spraying bullets galore in all directions, making Weiland's words believable. And although Weiland's drug abuse and sordid past provide plenty of engaging material, it's the rest of Velvet Revolver that keep things on course. On "Slither," for example, Weiland sings, "Cut the rope I fell to my knees/Born and broken every single time," but it's Slash's piercing solo and Sorum and McKagan's thudding foundation that really caves you in.

Throw in a power ballad or two, including the fine "Fall to Pieces," and "Contraband" shows all the signs of a rock band that has staying power. For our sake, let's hope Weiland and the boys don't self-destruct and take Velvet Revolver with them. Rock needs more bands like this.

Etta James

"Blues to the Bone"
RCAVictor
www.rcavictor.com
Our take: The queen takes on the giants quite ably.

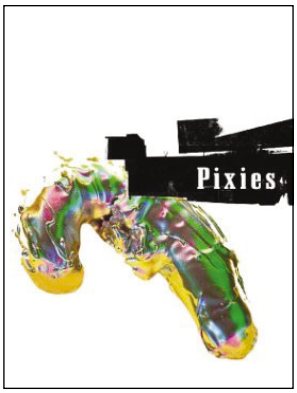
If B.B. King is the reigning king of the blues, then Etta James is its undeniable queen. "Mama" has been churning out gut-splitting, soul-charged albums since the mid-1950s when she came onto the scene, hooking up with Johnny Otis on "The Wallflower." Through the 1960s and '70s, James honed her craft on Chicago's venerable Chess Records, cementing her place among the best of blues and soul royalty with raspy, tell-it-like-it-is vocals.

On "Blues to the Bone," the Grammy-winning James breaks out some of the best and most famous blues standards ever written, torching them with her own gritty spiciness. We're not talking lightweights here, either, with the likes of Robert Johnson ("Dust My Broom"), Sonny Boy Williamson ("Don't Start Me to Talking"), Willie Dixon ("Lil' Red Rooster"), and Elmore James ("The Sky Is Crying") all represented. Throw in the late John Lee Hooker's "Crawlin' King Snake" and Howlin' Wolf's "Smokestack Lightnin'," and James pretty much covers all the bases.

"Blues to the Bone" is somewhat of a courageous move for James. Not only is she taking on legends (always a risky move), but she's also covering several styles and stepping into definite male-dominated turf. But if anyone can pull it off, it's James. For example, it's arguable that there's no reason for anyone to ever do Jimmy Reed's "Hush Hush"

again, but James more than holds her own. Backed by her sons, Donto and Sametto James, plus most notably John Logan on harmonica, James makes these songs her own.

James muscles up most on the beautiful "The Sky Is Crying," weaving in and out of the mud-soaked 12 bars with an authenticity only someone who's been hardened and wised up by the road can deliver. James lacks some of the range she possessed a decade ago, but her voice still cuts deep and true. Ultimately, "Blues to the Bone" doesn't cover any new ground, and it would be interesting to hear what James would cook up if she were backed by the leading players in the genre (Buddy Guy, Charlie Musselwhite, etc.), but hearing the leading lady put her spin on tunes from the pioneers is time well invested.



The Pixies
"Pixies" (DVD)
4ad
www.4ad.com
Our take: The innovators caught soaring live and in full effect.

Here's the thing: There's a decent chance you've haven't heard of The Pixies, let alone the songs the Boston-based foursome released beginning with 1987's seminal album "Come Pilgrim." It's a safe bet, however, that you've heard the effect the band's songs have had on alternative rock since. The next time you're flipping the radio dial and hear "Smells Like Teen Spirit" or something from Jane's Addiction, Pearl Jam, Radiohead, Foo Fighters, Queens Of The Stone Age, The Flaming Lips, Blur, The Strokes, Smashing Pumpkins, Tool, or any one of dozens of bands that have come and gone, you're hearing big chunks of The Pixies.

"Influential," "revolutionary," and "ahead of their time" go hand in hand with the band. Fueled by the unorthodox songwriting and lyrics of singer/guitarist Charles Thompson (aka Black Francis, Frank Black), The

Love Actually

True Romance In The UK, Again

From longtime screenwriter but first-time director Richard Curtis comes another romantic postcard from England, "Love Actually." But unlike his previous films, "Four Weddings and a Funeral" and "Notting Hill," Curtis doesn't focus exclusively on the stammering mop-headed Hugh Grant and his charms (although he is in the film), instead telling several overlapping stories with an ensemble that reads like a UK Who's Who of Acting.

Grant plays, believe it or not, the newly elected British Prime Minister who becomes smitten with an assistant. Liam Neeson is a recent widower trying to connect with his young stepson Sam (scene-stealing Thomas Sangster). Colin Firth is a writer who falls for his Portuguese maid, and Emma Thompson plays a wife who suspects husband Alan Rickman of adultery. Curtis also includes a story of unrequited love featuring Keira Knightley, a potential office romance for Laura Linney, and a record company campaign to promote Bill Nighy's unlistenable remake of "Love is All Around" as Britain's No. 1 Christmas single. Billy Bob Thornton even makes a brief appearance as a Clinton-esque U.S. President whose womanizing and condescending attitude forces Grant to make an overt political statement regarding Britain's longtime "friend" from across the pond. While spreading the narrative wealth lets Curtis explore more complex interpersonal themes, he sacrifices the emotional resolution of some stories, as well as character development. Still, the whole of "Love Actually" is greater than the sum of its parts, which is why it ultimately works as a humorous and frequently touching romantic comedy.

Bonus features include an entertaining commentary with Curtis, Grant, Bill Nighy, and Thomas Sangster. The commentary recording was the first time the actors had seen the film, making for a spontaneous and lively discussion. Curtis reveals that "Love Actually" initially clocked in at almost 3 1/2 hours, thus requiring some severe editing. Curtis introduces 10 deleted scenes in a featurette, with several adding depth to the relationships, particularly the ones between Neeson and Sangster. In another featurette, Curtis discusses the film's excellent soundtrack and why he included songs by Joni Mitchell, Eva Cassidy, and The Beach Boys. ■

Disc Specs: 135 minutes; Dolby Digital 5.1 English; Dolby Surround Spanish and French; widescreen anamorphic 2.35:1; enhanced widescreen for 16:9 TV; feature commentary with actors Hugh Grant, Bill Nighy, Thomas Sangster, and director Richard Curtis; 10 deleted scenes; the music of "Love Actually"; Kelly Clarkson music video "The Trouble With Love Is."
Studio: Universal
MSRP: $26.98

Pixies garnered nearly universal critical success with 1988's "Surfer Rosa" and 1989's "Doolittle" but received much less attention from music fans in an era in which the likes of Michael Jackson ruled the pop radio landscape. The band continued on that course until 1993, when the group parted ways less than amicably.

Seemingly like all good things, however, The Pixies are back in 2004, and back in a big way. In April, the band reunited for a world tour that has consistently sold out shows and drawn critical and fan appreciation. To accompany the tour, The Pixies' label, 4ad, released "Wave of Mutilation—Best of the Pixies" on CD and "Pixies," a DVD containing a 1988 performance at The Town and Country Club in London; seven videos; behind-the-scenes video footage; and "Gouge," an excellent documentary featuring interviews with Black, guitarist Joey Santiago, and drummer David Lovering, plus British rock journalists, David Bowie, Radiohead's Thom York, Bono, PJ Harvey, and others.

Within seconds of launching into "The Holiday Song" on "Pixies," old fans will remember exactly why the band was so good, and new fans will wish they had caught the act the first time around. Black sets the sonic pace and Santiago's head-splitting solos add the texture on "Bone Machine," Gigantic," and "Caribou," among others. For new listeners, The Pixies' songs take several listens to sink in, but as Bowie says in "Gouge," few people may have The Pixies records over the years, but those that did started bands because of the influence. On "Gigantic," the dichotomy of bassist Kim Deal's wonderfully melodic vocals floating along under Black's chaotic, quirky verses exhibit the exact nature of what made The Pixies so addictive.

If you missed The Pixies the first time around and alternative rock is where your heart resides, you owe it to yourself to seek out The Pixies' back catalogue. "Pixies" is a fine place to begin. CE

By Blaine A. Flamig

The Good, The Bad and The Ugly SE (2-Disc Collector's Set)

The Tastiest Spaghetti Western

The Civil War serves as the backdrop for the finale to the Man With No Name trilogy ("A Fistful of Dollars" and "For a Few Dollars More"). This special-edition DVD re-release of "The Good, The Bad and The Ugly" features 18 minutes of restored deleted scenes from the original Italian print of the film to create the movie director Sergio Leone originally wanted us to see in America. As it turns out, this is also the film that made Clint Eastwood a household name.

It's difficult to imagine someone who doesn't know the basic premise of the story, but let's cover it briefly for posterity. Three men are going after hidden treasure: Blondie's not really as bad as the rest and is marked as the Good guy (Eastwood); the steely-eyed Angel Eyes (Lee Van Cleef) is as Bad as they come; and Mexican bandito Tuco Ramirez (Eli Wallach) is the Ugly one. While the plot may be conventional, the acting, directorial style, and music are incredibly memorable for this 1966 classic Western. Watch the movie and you'll see that there's good reason Leone's directorial style has so heavily influenced a bevy of modern filmmakers.

This is the best transfer "The Good, The Bad and The Ugly" has ever received, even if the video itself is flawed. However, these flaws are the result of a very old print and not the transfer to DVD. You won't see a better print of the movie as the source material is nearly four decades old. There is some graininess to the film, and smudges are obvious when they occur. But when all is said and done, this is the best version of the film you can expect to find. Its color is more crisp and vivid than we anticipated, and that's a compliment to MGM. The disc features the original mono Italian audio track, but the 5.1 track has been masterfully created, even though it understandably makes minimal use of the surround channels. With the exception of the slow-paced audio commentary track accompanying the movie, the extras will be interesting to any fan of the film. The packaging is a box with a lid; contained within are international poster reproductions and a snazzy eight-page booklet with an intro by Roger Ebert. The film is not rated, but we'd suggest parental guidance. ■

By Samit Gupta Choudhuri

Disc Specs: 179 minutes; 2.35:1 Anamorphic Widescreen; English Dolby Digital 5.1 and original Italian track in Dolby Digital 2.0 Mono with English, French, Spanish, Cantonese, and Mandarin subtitles; audio commentary by film historian Richard Schickel; Disc 2 features 19-minute Leone's West and the 23-minute The Leone Style documentaries in Anamorphic Widescreen, The Man Who Lost the Civil War, Reconstructing The Good, The Bad and The Ugly, Il Maestro: Ennio Morricone And The Good, The Bad and The Ugly documentaries, Deleted Scenes (two of them), Poster Gallery and trailers.
Studio: MGM
MSRP: $29.98

Game On

Fast Cars & Movie Stars Shine In This Month's Games

The Chronicles Of Riddick: Escape From Butcher Bay (Xbox)

Riddick will have his work cut out for him when taking out the nearly invulnerable Riot Guards. We said nearly—get to the back door.

VU Games' The Chronicles Of Riddick: Escape From Butcher Bay is a memorable A-List game that Xbox action gamers (recommended for ages 18 and up) shouldn't miss. EfBB is a prequel to both the underrated "Pitch Black," which hit theatres about four years ago, and its sequel, "The Chronicles Of Riddick." There's no point beating around the bush: Most movie-licensed games released to coincide with their corresponding movies are just awful. Those few that aren't awful fall into the average or above-average categories but end up as wispy memories. (The excellent Tron 2.0 and Star Wars: Knights Of The Old Republic are based on movie licenses but not directly on films.) Having said that, this Xbox-exclusive title is a rare mid-summer gem that ranks as one of the best Xbox action games released to date.

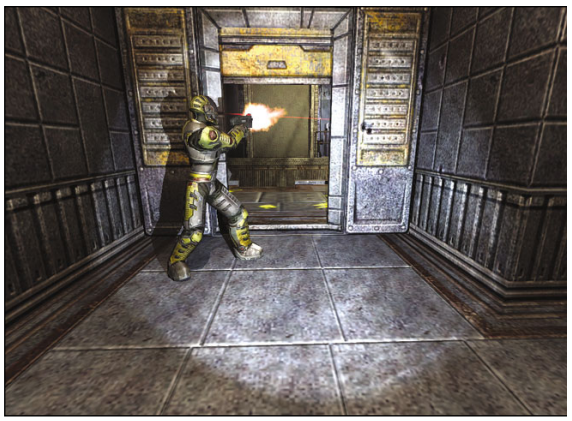
You start the game as Riddick, who is brought to the Butcher Bay prison by a bounty hunter known as Johns. Butcher Bay is not a pleasant place; it's a harsh, dark reality that's made to seem only less hellish because later levels introduce you to even more horrific locales. Richard B. Riddick's single-minded goal is to leave Butcher Bay behind. Naturally, what Mr. Riddick wants, he gets. As you start playing, you'll slowly notice the game's hybrid gameplay. EfBB is an action-adventure game with a light RPG wrap combined with optional stealth play. So those of you sick of sneaking around in order to avoid combat (Splinter Cell, Manhunt, Hitman: Contracts, Thief: The Dark Project) will finally be able to cut loose on the bad guys—yes, the feeling is very therapeutic.

The game's presentation is first-rate: You can play in 480p with full 16:9 support. The environments are rough, realistically textured, and *immersive*. The atmosphere hangs thick and heavy, and you'll often find yourself in pitch-black locations long before you gain Riddick's see-in-the-dark EyeShine talent. The Chronicles Of Riddick

Yes, recharging Riddick's health looks painful, but it doesn't prevent Vin Diesel from broadcasting his "adore me" persona.

supports 5.1 audio and has an average soundtrack. What does stand out is the excellent voice acting. We find Vin Diesel's ego as annoying as the next chap, but he has an excellent video game voice. In fact, EfBB's voice acting is of the highest caliber for all actors. You might see Ron Pearlman's ("Hellboy") name mentioned, but his voice time is minimal. Vin Diesel is the real star, and he delivers in spades.

We're not going to give away anything more about the absorbing story, but there are moments where watching the film will fill holes in the game's plot. You will start off with nothing, but you'll eventually get familiar with the game's hierarchy as you gain the respect



This game is definitely one of the best-looking shooters we've seen on Xbox. Just check out the dynamic shadow and detailed textures.

of your peers. Smaller items (smokes and shivs) will become available, and you'll go toe to toe with some of the inmates. Guns are DNA-encoded to the guards, so you won't even be able to pick up a gun until you've spent a nice chunk of time in the game. The enemy AI is usually pretty intelligent and keeps the game interesting. Some gamers will balk at the 12 or less hours it'll take to finish EfBB, but we think action gamers will find the single-player game worth every penny. Just one question: Why no Xbox Live gameplay support? The game just cries for it. Check it out. ■

BY SAMIT GUPTA CHOUDHURI

The Chronicles Of Riddick: Escape From Butcher Bay

$49.99
VU Games
www.riddickgame.com
ESRB: Mature

Full Spectrum Warrior (Xbox)

You'll have to coordinate your team's maneuvers if you want to take out the bad guys in Full Spectrum Warrior.

Part puzzle game, part third-person shooter, Full Spectrum Warrior simulates squad tactics in a variety of combat situations that take place in a fictional country that looks suspiciously like a dust-blown Iraq. Instead of controlling individual grunts, players are put in charge of two four-man fire teams, each controlled independently to support the other team by using covering fire and keeping their eyes peeled for enemies.

The game originally was commissioned by the U.S. Army for use as a training tool to teach soldiers how to fight in urban environments (the Army version is actually included on the disc and is accessible via a cheat code), and its pedigree shows. The only way to progress through the choked streets and alleyways of the various environments is to leapfrog from street corner to street corner, huddling behind cars, rubble, and other cover whenever necessary. Cover is key, as both teammates and enemies who are behind cover are invulnerable to frontal attacks. Players must get around this by using one team to pin the enemy with suppressing fire while advancing with the other team.

These are sound tactics, but they also are extremely repetitive. With few exceptions, players have seen everything this game has to offer by the time they complete the training missions. To the game's credit, it does have excellent graphics, especially in widescreen mode, and the interface is virtually flawless. Issuing orders quickly while still keeping the teams in cover becomes second nature, and for the most part, mission goals are clear enough that players always have a handle on what they should be doing. It's just too bad that enemies always appear in the same places (even though they appear randomly in the Army version) and that there isn't more for players to do. Full Spectrum Warrior may be an excellent simulation of the type of work infantry soldiers typically do, but when it's this dull, it doesn't necessarily make for an enjoyable game. ■

BY TRACY BAKER

Full Spectrum Warrior

$49.95
THQ
www.fullspectrumwarrior.com
ESRB: Mature

RalliSport Challenge 2 (Xbox)

RalliSport Challenge 2 features amazing visuals. Check out the reflections of the overhead trees on this speeding Saab.

The original RalliSport Challenge was a graphical powerhouse of a game that impressed both visually and with its entertaining gameplay when it was released in 2002. The game seemed to lose its legs early—probably because rally racing doesn't get much exposure in the United States. You can't call RC2 a sim (that honor is reserved for something in the vein of Codemasters' Colin McRae Rally series), but it is a lot of fun. The full-fledged 16-player Xbox Live support bolsters the improved single-player game. Swedish developer Digital Illusions CE listened closely to criticisms and has produced a worthy sequel.

Because this isn't a sim, you don't have to know anything about rally racing to enjoy gameplay to the fullest. The photo-realistic graphics are the first thing you'll notice upon loading up and jumping in: beautiful and realistic-looking environments, excellent weather effects, and a wonderful selection of detailed cars. An Xbox racer has never ever looked better.

Keep on playing, and you'll find a polished game under the gloss. The single-player modes will be familiar to fans of the original, but there's enough here to keep you busy for a long time—at least until Microsoft's Gran Turismo challenger, Forza Motorsport, is available late this year. The Time Attack, Single Race, and Career Mode follow the tried-and-true racing-game formula, but it's the hearty multiplayer mode with Xbox Live and split-screen support that will keep you coming back. RalliSport Challenge 2 is not a groundbreaking game, but it's well worth its cost for that off-road feeling of speed that you get whenever you punch the gas. ■

BY SAMIT GUPTA CHOUDHURI

RalliSport Challenge 2

$49.99
Microsoft Game Studios
www.xbox.com/rallisportchallenge2
ESRB: Everyone

Shrek 2 (NGC, PS2, Xbox)

Pay close attention to the E rating on the party game Shrek 2 from Activision. It serves as a parental guide and helps describe the kid-friendly gameplay, which is never quite as sardonic (or as edgy) as what you'll find in the summer movie starring the world-famous green ogre. In some ways, Activision has taken a few important cues from Nintendo party games. Shrek 2 is colorful and intuitive and lets players connect and disconnect at will in a story-driven multiplayer arena, but it might leave you feeling a bit stale if you liked Shrek for the subtle adult bits.

At first it seems as though Luxoflux nailed the movie-to-game transition, right down to Shrek's wrestling moves and Donkey's self-effacing ways. The four-player puzzles and action sequences also feature Fiona and a revolving door of fourth-string players, including Gingerbreadman and Puss-In-Boots. The game matches up pretty well with the movie storyline: The happy newlyweds must make the requisite visit to the in-laws' in Far Far Away Land but discover (shockingly!) that Fiona's parents are not too pleased about their daughter's new look. Enter a control-happy fairy godmother and lots of kids' storybook characters for a rather cheeky mix of obvious Disney swipes and jokes involving chicken stew.

Gameplay consists primarily of completing puzzles in which you'll need to rely on each character's special moves and unique abilities. Shrek gets a lot of screen time because he's the most powerful and can carry objects. Donkey does a nifty Burro Blast that comes in handy in the various movie locations (including the swamp shack) and a few new locales, such as the Dwarven Mines. But none of the movie actors voiced the game characters, so the humor is a bit less effective. There's a cool Hero Time mode where one character gets to slow down time or perform a one-time move, but the fighting sequences feel a bit lifeless.

The game looks gorgeous on Xbox but in no way matches up with the CGI animation of the movie. That's probably the biggest letdown. You start the game expecting an extension of the theatrical plot twists and innovative style and slowly discover that it's just Mario Party in a pale green skin. ■

Shrek 2 features the big, green ogre fighting his way through the Far Far Away Land.

BY JOHN BRANDON

Shrek 2

$39.99
Activision
www.shrek2thegame.com
ESRB: Everyone

Syphon Filter: The Omega Strain (PS2)

Syphon Filter: The Omega Strain is the fourth game in a series that has been trying to find its place in the PlayStation lineage, finally appearing on the "next-generation" PS2 console just a bit late for the party. There are better third-person shooters with more precise controls (even Namco's kill.switch was more playable), but Omega Strain succeeds with a cool story and a unique co-op online mode.

Syphon Filter: The Omega Strain is all about presentation. Every menu and even the load screens make you think you're signing up for an elite antiterrorism unit, the ICPA. Instead of playing a defined character, you mix and match various body parts to create your own avatar. It works OK, but you end up feeling like a generic pawn in the action. The fact that you merely jump back to the last checkpoint when you die (with no cut scenes or fatality music) reinforces that sense.

Over the course of 17 darkly-lit missions, you'll do a lot more than just flip switches to open the next fence gate. There's a heavy emphasis on combat mixed with some light plot intrigue and item collection. Amazingly, Sony integrated a compelling online mode that feels like it's part of the single-player game (even though you have to go through the typical login screens). With three other players, you can complete co-op-only missions over a broadband-only connection. You'll use the same custom character and weaponry, so it feels like a logical extension to the game play rather than a "we-do-online-too" add-on.

The most obvious flaw in the game is the third-person camera, which is just a bit awkward. The game's right-analog stick camera controls are useless. You have to target enemies using R1 but can enter a first-person mode with L1. Meanwhile, the camera is constantly lagging behind your movements. Syphon Filter: The Omega Strain probably would work better as an action-adventure game, but as a tense combat game, it will only appeal to shooter fans and Syphon fanatics. ■

Dark corners and dark themes are highlights in this average shooter.

BY JOHN BRANDON

Syphon Filter: The Omega Strain

$49.99
Sony
www.syphonfilter.com
ESRB: Teen

Siren (PS2)

Siren is the story of the nightmarish events that take place in a rural Japanese village called Hanuda over the course of three days. On day one, a mysterious ceremony is followed by a minor earthquake, after which all the area's water turns blood red. Following the quake, the village is mostly deserted except for a few citizens who have become shibito, or walking dead, and some seemingly normal folk who are somehow alive. The folks left alive must figure out what happened (what was the ceremony that took place on the day of the earthquake, how is it connected, etc.) while steering clear of the shibito, who, as you might expect, are none too friendly.

Players assume the role of several characters of varying ages as they attempt a series of missions, many of which consist of escaping portions of the dark, unnerving village alive. Along the way, you'll guide characters in third- and first-person perspectives as they explore, solve puzzles, and fend off the disturbing attacks of smart zombies who can use weapons and open doors.

This all may sound familiar, but there's a twist: For a reason that is unclear at the outset, your characters have the ability to sightjack, or see through the eyes of others—including the shibito. Sightjacking helps you avoid attacks and find items of importance. Although viewing a zombie's entire patrol while you hunker out of sight is fairly time-consuming, it is a cool feature that effectively complements Siren's dark, creepy graphics and eerie sound effects.

Siren is really more adventure game than action, and it can be slow at times. But if you enjoy puzzle solving and a good horror story, heed the call of Siren. ■

BY CHRIS TRUMBLE

The first character you play, Kyoya Suda, gets help from a mysterious "spiritual guide," Hisako Yao. Get used to the dark.

Siren

$39.99
Sony Computer Entertainment America
www.siren.playstation.com
ESRB: Mature

TOCA Race Driver 2 (Xbox)

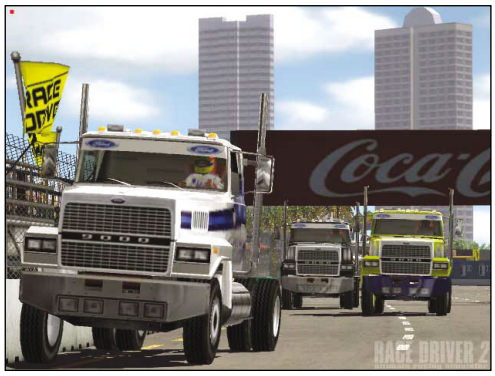
TOCA Race Driver 2 may not have the massive number of cars found in the Gran Turismo series or the beautifully detailed urban environments of the Project Gotham Racing series, but no other racing game can touch it in terms of diversity. Car nuts are treated to no less than 15 styles of racing that range from open-wheel Formula Ford and Grand Prix to off-road rally and rally cross to stock car and hot rod street racing. One championship series even puts players behind the wheel of a lumbering semi truck.

The various championships are welded together in an intriguing career mode that is not realistic in the least but offers plenty of options and challenges. Finishing high in the rankings is essential for picking up sponsors and progressing to the next championship series, which become tougher as players rise through the ranks. Just when you get used to the fish-tail-happy and slow cars of yesteryear in the Classic Racing championship, the game offers up a Global GT Lights championship with cars that are practically glued to the track but move blindingly fast. With a lesser design, this much change would be absolutely frustrating, but with the exception of the rally racing series, TOCA Race Driver 2 has good enough controls that transitioning from one championship to the next is a pleasure.

This is more an arcade game than a simulation, but there are nods to realism. Cars accumulate damage to the tires and engines, and it's possible to lose a wheel or blow an engine during a race. With up to 21 cars on the track at any one time, avoiding collisions is a white-knuckle experience made even more hair-raising by the aggressive AI-controlled competition.

The game's graphics are superb, and what they lack in detail, they make up for in draw distances that let players see seemingly for miles down the track. A number of licensed vehicles are available, including the Ford GT, the Jaguar E-Type, and the AC Cobra, and they race on dozens of tracks ranging from Laguna Seca to ovals such as the Texas Motor Speedway. They say quantity has a quality all its own, and the multitude of racing styles and tracks in TOCA Race Driver 2 help elevate it to the top of the pack. ■

BY TRACY BAKER



Racing stock cars is easy. Try jumping behind the wheel of one of these rigs.

TOCA Race Driver 2

$29.99
Codemasters
www.codemasters.com
ESRB: Teen

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PDAs: The Smallest PC Grows Up Quickly

The personal digital assistant, or PDA, has become an indispensable tool for millions of people. But just 10 years ago, barely anyone had ever heard of the device, and even the most powerful PCs didn't offer some of the features that PDAs do today.

A PDA is a handheld computer that is composed of a powerful microprocessor, memory, and a variety of software. Today some of the most full-featured PDAs also play digital audio and video and connect wirelessly to the Internet and to other devices.

The history of the modern PDA began 20 years ago, in 1984, when a British company named Psion introduced the Psion Organiser. It was "the world's first volume-produced handheld computer," according to Psion.

The Psion featured an alphanumeric keypad, a one-line LCD, 4KB of ROM for built-in software that included a clock, a calendar, and10KB of RAM for the user's data. The RAM came in two "Datapak" cartridges.

The First PDA

In 1986, Psion introduced the Organiser II. The top of the line model LZ featured 32KB of ROM, 64KB of RAM, and a four-line, 20-character LCD screen. Psion now describes the Organiser II as "the world's first PDA," and notes that more than 500,000 were sold over the next 10 years.

In 1991, Psion unveiled the Series 3, a clamshell design handheld computer. Psion introduced several upgraded versions of the Series 3—the 3a, 3c and 3mx — between 1993 and 1998, and offered up to 2MB of RAM, an eight-line, 40-character display, a graphical user interface controlled by the keyboard, and applications that included a word processor.

While Psion was developing its products, several competitors entered the fray, including Sharp Electronics, GRiD Sys-tems, Apple Computer, Mic-rosoft, and a newcomer named Palm Computing.

One of the earliest competing products, and another predecessor to the PDA, was an electronic organizer from Sharp named the Wizard, introduced in 1988. The Wizard featured a keyboard, a small LCD, and built-in appointment book and to-do list software.

But even as Psion and Sharp were touting products with keyboards, others were working on a new scheme: the touch-sensitive LCD and a stylus, which would be used in conjunction with handwriting-recognition software. The first to market with a handheld computer built around this scheme was GRiD, which unveiled its GRiDPAD in 1989.

Then, in early 1991, Microsoft announced the first beta test version of Windows for Pen Computing, or Pen Windows, an operating system for handheld computers that was based on the Windows 3.1 OS. In April 1992, Microsoft released a final version of Pen Windows, with support from 220 companies.

Apple, too, was working on a pen-based operating system and a hardware device to use it. This was the Newton MessagePad, which Apple introduced in 1993—and, with it, the term PDA. Apple CEO John Scully coined the term PDA to describe the Newton, and promised that the device would change the way people worked and lived by anticipating the user's wants and needs. The Newton featured a touch-sensitive LCD, handwriting-recognition software, and a variety of useful applications, such as a calendar program that was supposed to automatically record an appointment if the user jotted down, for example, "Meeting with boss tomorrow at noon."

But the Newton was big and bulky, and its handwriting-recognition software often misinterpreted what the user wrote. By 1998, after several iterations of the device, none of which sold well, Apple discontinued the Newton.

By then, however, the PDA landscape had changed entirely, because in March 1996, Palm (then a division of U.S. Robotics) introduced the PalmPilot.

The PalmPilot established the baseline for the current crop of PDAs because it was small enough to fit in a pocket, featured simple, easy-to-use appointment book, address book, to-do list and memo software, had handwriting-recognition software that worked well, and boasted a user interface composed of a

The original PalmPilot inspired a generation of PDAs.

touch-sensitive LCD, a stylus, and four buttons for launching the core applications. It also was relatively inexpensive. It was based on a proprietary operating system developed by Palm, the Palm OS.

Shortly after the PalmPilot debuted, Microsoft introduced another new operating system for handheld computers, named Windows CE. The race between Palm and Microsoft for domination of the PDA market was begun.

Palm vs. Microsoft

Nearly every year since 1996, both Palm and Microsoft have brought forth more powerful PDA platforms. Microsoft's WinCE has been marketed in PocketPCs made by well-known PC and consumer-electronics brands, including HP, Compaq, Casio, Dell, and Toshiba. Palm has sold its own brand of PDAs and also licensed its technology to others including Sony and Handspring, a company formed independently in 1998 by Palm's founders.

Among the technology milestones of the Palm platform in these years were the first PDA with wireless access to the Internet, the Palm VII, in 1999; the first PDA with an expansion slot for attaching a peripheral such as an MP3 player or a digital camera, the Handspring Visor, in 1999; the integration of a cell phone with a PDA, via Handspring's VisorPhone expansion module, in 2000; and the combination of a PDA, a wireless phone, wireless text messaging and wireless Internet access in a single device, the Handspring Treo, in 2002.

Among the technology milestones for the Microsoft Windows CE platform in these years were the addition of PC-like multimedia capabilities, including the power to show video and play digital audio on a color LCD, in 2000, thanks to a powerful 206MHz microprocessor from Intel named StrongARM, and the first handheld computer with built-in biometric security technology (fingerprint recognition) in 2001, the Compaq iPAQ 5400 series.

The newest Intel XScale processor, unveiled this year, lets a PDA feature a built-in 4MP (megapixel) digital camera, DVD-quality video playback, and the ability to play 3D video games that rival the quality of games made for consoles such as the PS2 or Xbox. It is used in both Palm- and Microsoft-based PDAs.

Yet even as new brands have entered the PDA marketplace, others have exited.

After the Series 3, Psion introduced a other handheld computers, including the Series 5 in 1997. And in 1998, the company joined with Nokia, Ericsson, and Motorola to form Symbian, a joint-venture company that worked on a new OS for mobile phones and PDAs with cell phone capabilities. Then, in 2000, Psion announced that it would exit the consumer-oriented handheld computer market and focus solely on the industrial mobile computing market.

Sharp followed its Wizard electronic organizer with a PDA named Zaurus. But Sharp, too, has abandoned the consumer PDA market, and its latest Zaurus model also is aimed at the industrial mobile computing market.

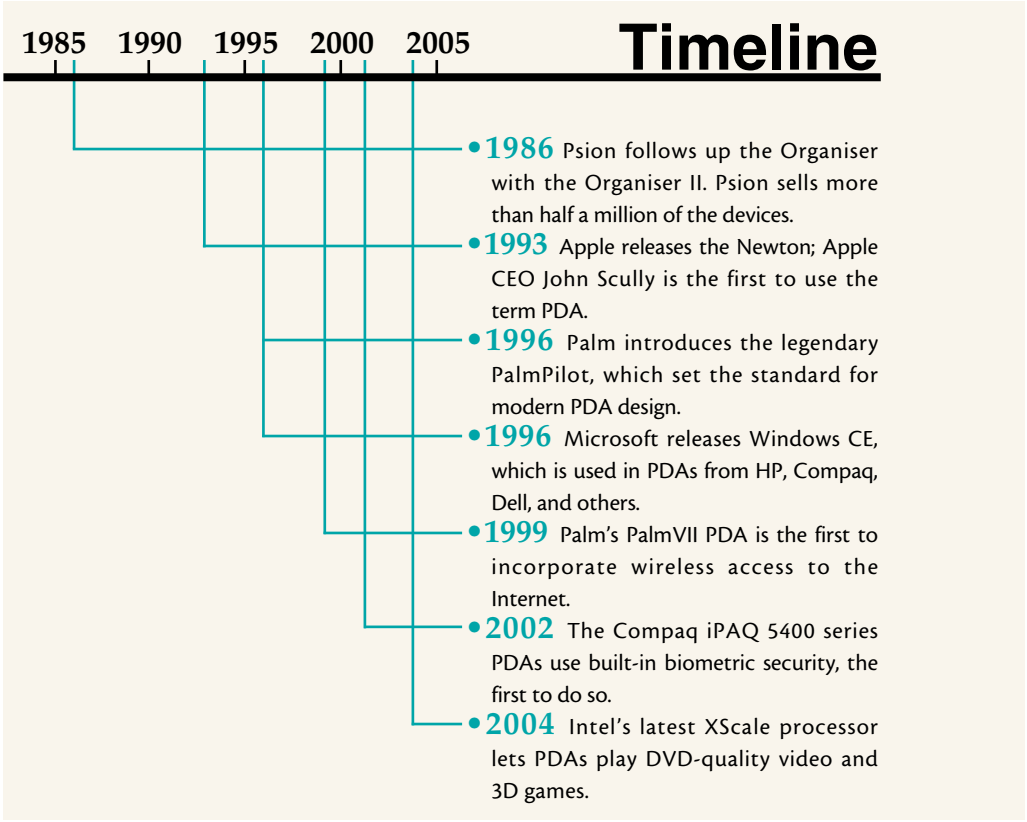
Today, while one side of the PDA market is revolving around models that are just PDAs, another side is focused on do-all models that double as cell phones.

At the same time, there are cell phones now that offer the same functions once found only in PDAs.

"The future is about connectivity," declares Paul Hiles, manager of emerging products and strategy at HP. All PDAs will be PDA phones in the future, Hiles says, because all will have cellular phone technology built in for both voice communications and data communications. Still, despite the convergence that is taking place today, he predicts, it will be the cell phones with PDA technology that will garner the greatest market share in the future.

"Now we're getting closer to all the things the Newton promised. Now we have the horsepower to be able to deliver on the original promise of the PDA," says David Rogers, wireless marketing manager for Intel. "The form-factor will probably be with us for a while, but the functionality is being dispersed," he says.

BY ROBERT E. CALEM



CE Pick Of The Month

Elite Audio At A Less-Than-Elite Price

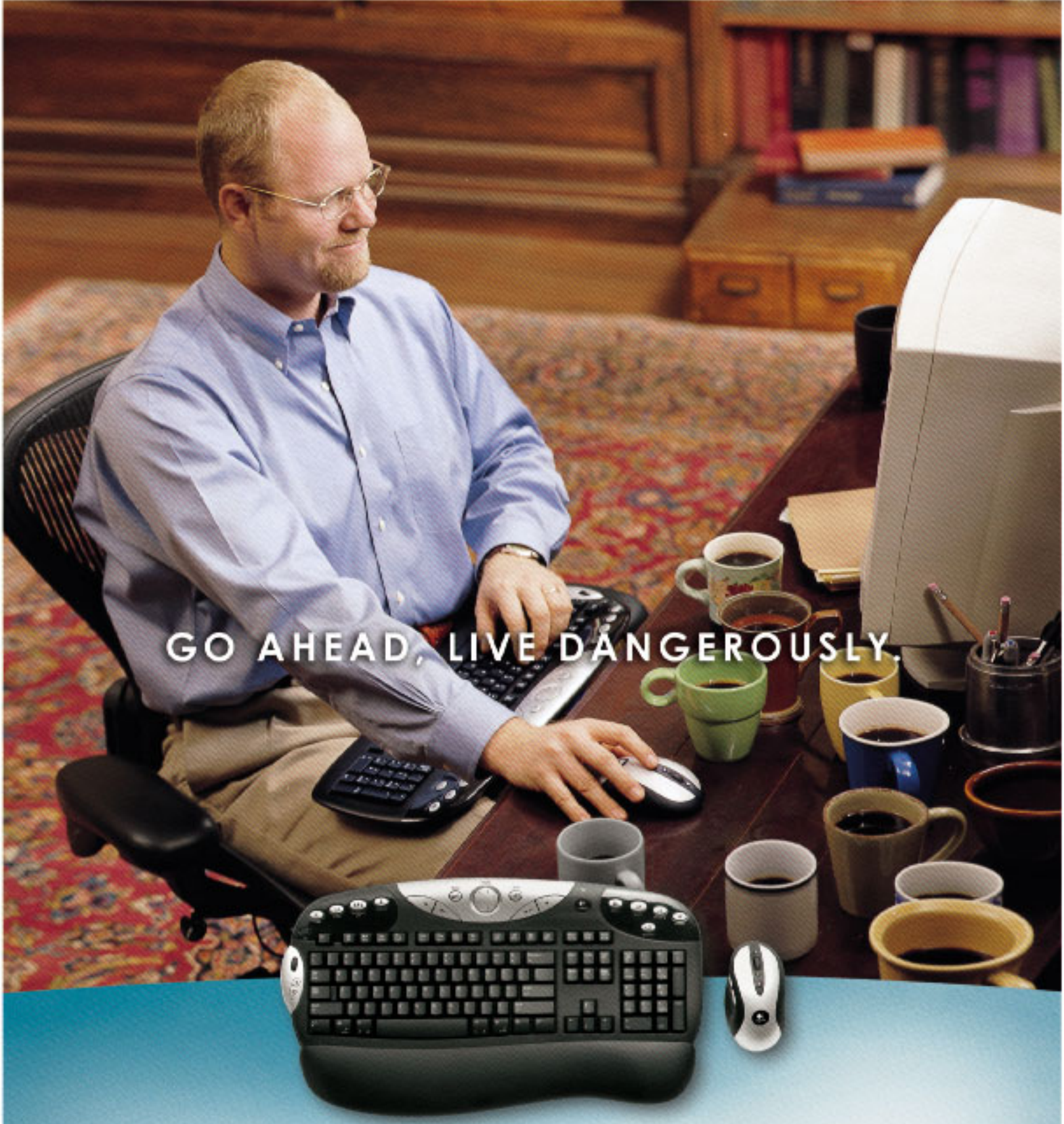
We've said it before, and we'll no doubt say it again: Aside from your TV, no single component is as important to the overall quality of the home theater experience as your setup's A/V receiver. It has a hand in delivering and amplifying every signal that passes through your components and on to your waiting senses, and it's the last place you should consider cutting corners.

Having said that, though, it's not always practical to spend $1,000 or more on a receiver, especially if you're building an entire system and you still need to get a good TV, speakers, DVD player, etc. And as much as we hate to admit it (in case certain significant others are reading), not everyone needs 150 watts per channel.

That's why we love the Harman Kardon AVR 330 (reviewed on page 88). Even if budgetary concerns or paper-thin apartment walls trump your desire for lots of watts, there's no reason you shouldn't still get the aural splendor of 7.1-channel audio, not to mention a full range of input and output options and Harman Kardon quality. For $799, the AVR 330 supports nearly every popular surround-sound format, comes with every connection type, provides extensive multiroom options (including a second remote control), and offers EzSet calibration that automatically adjusts your sound levels to optimum settings with help from a tiny microphone built into the 330's primary remote.

Harman Kardon has long held a reputation as one of the finest audio component manufacturers in the business, and the AVR 330 does the name proud at a price that fits in just about any home theater budget. That's why it's our CE Pick Of The Month for August. CE

Harman Kardon packs the AVR 330 with connection options and features that you'd normally find in receivers that cost several times as much.



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Our Best Sound Ever.

QuietComfort® 2 headphones deliver the best audio performance we've ever developed for headphones. Highs are impressively crisp and clean. Lows are deep and enveloping. Vocals are reproduced with lifelike authenticity. When audio critic Wayne Thompson heard our QuietComfort® 2 headphones, he reported, "Bose engineers have made major improvements." Whether you're looking for noise reduction or high-performance headphones for music, we think you'll agree – QuietComfort® 2 headphones simply make your music sound better.

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